Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 113

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 2 & 0 & -1 & 0 \\ 1 & 1 & -1 & 0 \\ 0 & 2 & 0 & 1 \\ 1 & 0 & -1 & 0 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -4 & -5 & 3 \\ -2 & ? & 8 & -4 \\ 1 & -2 & ? & 2 \\ 1 & -1 & -4 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 0 & 0 & -1 \\ 0 & ? & 0 & -1 \\ 1 & 0 & ? & -2 \\ 0 & -2 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & -1 & 0 \\ 1 & ? & 2 & 1 \\ -2 & -2 & ? & -2 \\ 1 & 1 & 1 & ? \end{pmatrix}$ 4) $\begin{pmatrix} ? & -3 & 1 & 1 \\ 2 & ? & -2 & -3 \\ -1 & -1 & ? & 1 \\ -1 & -2 & 1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & 0 & -1 \\ -2 & ? & -1 & 1 \\ 3 & -6 & ? & -1 \\ -1 & 1 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -2 & 0 & -1 \\ 0 & ? & 1 & 1 \\ 0 & 0 & ? & 0 \\ -1 & 0 & 2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 0 & 0 \\ 1 & ? & 1 & -1 \\ -3 & 1 & ? & 0 \\ 1 & 0 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 -2 3 -4), (1 0 -2 2), (1 -2 1 -2), (0 -4 3 -1), (1 2 -2 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-8 4 6) is a linear combination of the vectors

(0 2 2), (1 0 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X + \begin{pmatrix} 3 & -1 \\ 1 & 0 \end{pmatrix}\right) \cdot \begin{pmatrix} 0 & -1 \\ 1 & -1 \end{pmatrix}^{-1} = \begin{pmatrix} -2 & 2 \\ 0 & 0 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * \\ 0 & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & 0 & 0 & 0 \\ 1 & 0 & 2 & 1 \\ 1 & 0 & a & -1 \\ 1 & 1 & 0 & 2 \end{pmatrix}$ has determinant 7?

1) -2 2) -4 3) -5 4) 4 5) 5

Exercise 6

Find the solution of the linear system

$$3x_1 - 5x_2 + 3x_3 - 5x_4 == -2$$
$$-2x_1 - 2x_2 + 2x_3 - 3x_4 == 4$$
$$7x_1 - x_2 - x_3 + x_4 == -10$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 17 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -7 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 4 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -4 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -3 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -8 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 12 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -4 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} 5 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 6 \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ 18 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 20 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -7 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	19K	4K	12K	10K
vegetable flours	6K	2K	4K	3K
fish flours	31K	5K	19K	17K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
136K	44K	221K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 11.

1) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

4) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

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List of exercises 04-Matrices/Linear Systems for identity number: 4501

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} -1 & 1 & -3 & -2 \\ 1 & 0 & 2 & 0 \\ 2 & -2 & 5 & 2 \\ 1 & -1 & 2 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -6 & 3 & 2 \\ 1 & ? & 1 & 1 \\ 4 & -5 & ? & 1 \\ -2 & 3 & -1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & 0 & 2 \\ 1 & ? & 0 & -1 \\ 1 & 1 & ? & -1 \\ -2 & -3 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & -2 & 3 \\ 0 & ? & 0 & 1 \\ -1 & 1 & ? & -1 \\ -3 & 2 & 2 & ? \end{pmatrix}$ 4)
$\begin{pmatrix} ? & 1 & -2 & 4 \\ -1 & ? & -1 & 0 \\ 0 & 0 & ? & -2 \\ -1 & 0 & -1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -1 & -2 \\ 1 & ? & 0 & 0 \\ 1 & 0 & ? & -1 \\ -2 & -2 & -4 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -1 & 0 \\ 3 & ? & 2 & 2 \\ -3 & -1 & ? & -2 \\ -5 & -1 & -3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 0 & 1 \\ 0 & ? & 0 & -1 \\ 7 & 0 & ? & 5 \\ 3 & 0 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-4 -1 -1 2 -1), (-2 -1 -2 0 -2),
(0 2 -1 0 0), (2 0 -1 -2 -1), (-2 -3 -1 0 -2),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-4 5 5 1) is a linear combination of the vectors

(-1 -2 -1 -2), (0 2 -1 0), (-2 -4 -2 -4)
, (-2 -4 -1 -4), (-2 -4 0 -4), (-1 -2 0 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 1 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 1 \end{pmatrix}.X + \begin{pmatrix} 0 & 0 & 1 \\ -2 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix} = \begin{pmatrix} 0 & -1 & 2 \\ -3 & 2 & -1 \\ 0 & -1 & -1 \end{pmatrix}$$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & -2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & -2 \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * \\ -1 & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ * & 1 & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$$\begin{pmatrix} -2 & -1 & 1 & 0 \\ a & -1 & 1 & -2 \\ 2 & 0 & 1 & 1 \\ 1 & 2 & -1 & 0 \end{pmatrix}$$ has determinant −8?

1) −5 2) −4 3) 4 4) −1 5) −2

Exercise 6

Find the solution of the linear system

$$8 x_1 + 10 x_2 - 4 x_3 - 10 x_4 - 2 x_5 + 4 x_6 == -2$$
$$-4 x_1 - 4 x_2 + x_3 + 5 x_4 + x_5 + 2 x_6 == 5$$
$$-x_1 - 2 x_2 + x_3 + 5 x_4 - 4 x_6 == -1$$
$$x_1 + x_2 - 5 x_4 == -3$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ 1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 17 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 2 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 4 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ 8 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ -6 \end{pmatrix}, \begin{pmatrix} ? \\ -10 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ -7 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 2 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ -1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 17 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -3 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -10 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 1 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -6 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	2K	7K	5K
Feed of company 2	1K	0K	1K
Feed of company 3	0K	2K	1K
Feed of company 4	1K	6K	4K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
10K	36K	28K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 13.

1) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=3, Feed 4=?

3) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

5) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

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List of exercises 04-Matrices/Linear Systems for identity number: 187462

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 5 & 1 & -4 & 1 \\ -9 & 0 & 7 & -1 \\ 3 & -2 & -2 & -1 \\ -5 & 1 & 4 & 0 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -6 & -9 & 6 \\ -1 & ? & -2 & 2 \\ 0 & -1 & ? & 1 \\ -2 & -2 & -3 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & 1 & 3 \\ 3 & ? & 1 & 0 \\ -2 & -3 & ? & 4 \\ -5 & -4 & -2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & -6 & -4 \\ 0 & ? & -2 & 0 \\ 0 & 1 & ? & 2 \\ 0 & -1 & -2 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & -2 & 0 \\ 3 & ? & -1 & 1 \\ 1 & -1 & ? & 0 \\ 2 & 1 & 2 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -2 & 0 \\ -4 & ? & -1 & 2 \\ 2 & 1 & ? & 0 \\ -3 & -1 & -2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -1 & -1 \\ 1 & ? & 0 & 0 \\ 1 & 0 & ? & 2 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -2 & 5 \\ -1 & ? & 0 & 2 \\ 2 & 0 & ? & -4 \\ -2 & -1 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 0 -1 2 -1), (2 0 1 -1 0), (-4 0 -2 3 -1), (-1 -2 2 1 -2), (-1 1 1 1 1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (2 -8 5 0) is a linear combination of the vectors

(-3 1 3 -3), (-2 2 1 -1), (-1 -1 2 -2), (1 0 0 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 1 & -1 & 1 \\ 0 & 1 & -1 \\ 0 & 0 & 1 \end{pmatrix}.X - \begin{pmatrix} 1 & -2 & -2 \\ 0 & 2 & 1 \\ 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & 3 & 3 \\ 0 & -4 & -1 \\ 0 & 0 & 0 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 1 & 1 & 0 \\ -2 & -1 & -4 & 2 \\ 2 & -1 & -3 & 1 \\ a & 1 & -2 & 1 \end{pmatrix}$ has determinant 6?

1) 5 2) 0 3) 3 4) 1 5) 2

Exercise 6

Find the solution of the linear system

$$x_1 - 22\,x_2 + 16\,x_3 + x_4 - 2\,x_6 == -4$$
$$-x_1 - 10\,x_2 + 7\,x_3 - 8\,x_4 - 9\,x_5 - 9\,x_6 == 0$$
$$-x_1 + 25\,x_2 - 18\,x_3 + 2\,x_4 + x_5 - 4\,x_6 == 5$$
$$-x_1 + 15\,x_2 - 11\,x_3 - 3\,x_4 - 2\,x_5 + x_6 == 3$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ -5 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -10 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -2 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -8 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 2 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 3 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -15 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 45 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -8 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 1 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -16 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ 2 \end{pmatrix} + \left\langle \begin{pmatrix} -6 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -7 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 43 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	5K	2K	4K
Feed of company 2	7K	3K	6K
Feed of company 3	2K	1K	3K
Feed of company 4	7K	3K	2K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
74K	31K	54K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=4, Feed 3=?, Feed 4=?

3) Feed 1=5, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

5) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

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Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 \\ 0 & -1 & 1 & 1 \\ 0 & -3 & 2 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -6 & -1 & 0 \\ 1 & ? & 3 & 3 \\ -1 & -5 & ? & -2 \\ -1 & -6 & -2 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 0 & 0 & 0 \\ 0 & ? & 2 & -1 \\ 0 & -1 & ? & 0 \\ 0 & 1 & 3 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -4 & 5 & -2 \\ 0 & ? & -2 & 1 \\ 0 & -1 & ? & -1 \\ 0 & -2 & 2 & ? \end{pmatrix}$ 4)
$\begin{pmatrix} ? & -2 & -3 & 0 \\ 1 & ? & -1 & 0 \\ 1 & -1 & ? & 0 \\ -1 & 1 & 3 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -1 & 0 \\ -2 & ? & -1 & 2 \\ -1 & 0 & ? & 0 \\ 2 & -1 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 1 & -1 \\ 1 & ? & -1 & 1 \\ 0 & -2 & ? & -1 \\ -1 & -2 & 5 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 1 & 4 \\ 1 & ? & 0 & 1 \\ 4 & 2 & ? & 4 \\ 1 & -2 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-1 0 2 0 -1), (-2 2 -2 1 2), (1 2 2 -1 2)
, (1 1 -2 2 -1), (-3 0 -4 2 0), (1 0 -1 -2 -2),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5 6) 6

Exercise 3

Check whether the vector (n-tuple) (1 -5 -2 -4) is a linear combination of the vectors

(-4 3 -1 2), (-4 4 0 4), (-1 -2 -1 1), (-2 2 0 2), (2 -1 1 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 1 & 1 & 1 \end{pmatrix} \cdot \left(X + \begin{pmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 1 & -1 & 1 \end{pmatrix} \right) = \begin{pmatrix} 2 & 0 & -1 \\ 0 & -1 & 2 \\ 4 & -2 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & 1 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix
$\begin{pmatrix} 1 & -1 & 2 & -1 \\ -2 & 1 & a & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & -1 & 1 \end{pmatrix}$ has determinant -7?

1) 4 2) 2 3) 1 4) -2 5) -1

Exercise 6

Find the solution of the linear system

$$-5\,x_1 + x_2 + x_3 - x_4 == -5$$
$$-3\,x_1 + x_3 - x_4 == 1$$
$$4\,x_1 - x_2 - x_3 + 2\,x_4 == 2$$

taking as parameters, if it is necessary, the
first variables and solving for the last ones (that is to say,
apply Gauss elimination technique selecting columns from right to left)
. Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ -6 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 2 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ -9 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -8 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -6 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -5 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ -2 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -2 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -6 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ -3 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 7 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ -5 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 3 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different
proportions as we can see in the table below which indicates the amount of
kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	1K	6K	2K
Feed of company 2	8K	11K	5K
Feed of company 3	3K	5K	2K
Feed of company 4	6K	9K	4K

The experts of the livestock farm determined
that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
55K	90K	38K

How many sacks of every company are necessary to reach the
recommended composition taking into account that, to properly store the
feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

4) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=5, Feed 4=?

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List of exercises 04-Matrices/Linear Systems for identity number: 2959749

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 3 & 0 & 2 & 0 \\ -3 & 2 & -2 & -1 \\ 4 & 0 & 3 & 0 \\ 0 & 1 & 0 & 0 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -8 & -4 & 5 \\ 0 & ? & 1 & -1 \\ 0 & 1 & ? & -1 \\ 0 & -7 & -3 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -7 & -4 & 5 \\ 1 & ? & -1 & 2 \\ -4 & 3 & ? & -2 \\ 2 & -2 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -5 & -3 & 2 \\ 0 & ? & 1 & -2 \\ 0 & -1 & ? & 0 \\ 0 & 2 & 2 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & -2 & 0 \\ 0 & ? & 0 & 1 \\ -4 & 0 & ? & 0 \\ -1 & -1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & -1 & -1 \\ -1 & ? & 0 & 0 \\ 0 & 3 & ? & 2 \\ 1 & 2 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -2 & 0 & -1 \\ -1 & ? & 0 & 2 \\ 0 & -1 & ? & 0 \\ 3 & 1 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -2 & 0 & -1 \\ 3 & ? & 1 & -1 \\ 1 & 0 & ? & 0 \\ -2 & 4 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

$(-4\ -2\ -2\ 2)$, $(-2\ -1\ -1\ 1)$, $(0\ 1\ 0\ -2)$, $(-1\ 2\ 2\ 0)$, $(-2\ 0\ -1\ -1)$,

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) $(-7\ 6\ 5)$ is a linear combination of the vectors

$(2\ -1\ 2)$, $(0\ -1\ 4)$, $(2\ 0\ -2)$,

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X - \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 0 & -1 \\ 1 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} -2 & -1 \\ 0 & -1 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 2 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} a & -2 & -1 & 1 \\ -1 & 0 & 1 & 1 \\ 2 & 0 & 2 & 1 \\ -1 & 1 & 3 & 2 \end{pmatrix}$ has determinant -7?

1) -1 2) -4 3) 4 4) -3 5) 3

Exercise 6

Find the solution of the linear system

$2\,x_1 + x_2 - 2\,x_3 - 2\,x_4 == 4$
$3\,x_1 + 2\,x_2 - 3\,x_3 + x_4 == -4$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ 0 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 0 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -8 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ -5 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -1 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ 2 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -5 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -1 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} 9 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 2 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 7 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ 1 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -9 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	4K	1K	6K
Feed of company 2	3K	2K	6K
Feed of company 3	2K	2K	5K
Feed of company 4	2K	1K	4K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
27K	14K	51K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 4 to be equal to 4.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=4

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

3) Feed 1=?, Feed 2=2, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

5) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 3180328

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 3 & -1 & 0 & 2 \\ 1 & 0 & 0 & 1 \\ 2 & -1 & 0 & 2 \\ 1 & -2 & -1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & 4 & -7 \\ 0 & ? & -1 & 2 \\ -3 & 2 & ? & 6 \\ 3 & 0 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 0 & -1 & 0 \\ 0 & ? & -1 & 0 \\ 0 & -3 & ? & -1 \\ -1 & 1 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & -1 & 0 \\ 1 & ? & 1 & 1 \\ 0 & 3 & ? & -3 \\ 0 & -1 & -1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & 0 & 0 \\ -1 & ? & -1 & 2 \\ 0 & 1 & ? & -3 \\ -1 & 0 & -1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & 0 \\ -3 & ? & 3 & -2 \\ -2 & 3 & ? & -1 \\ -1 & 2 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 3 & 0 \\ -2 & ? & 0 & 1 \\ -2 & -1 & ? & 0 \\ -1 & -1 & 2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -1 & -1 \\ -2 & ? & 1 & 1 \\ -1 & 0 & ? & 1 \\ -1 & 0 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 1 0 0 2), (-1 -1 -2 2 1), (-2 2 -1 2 2), (-2 -2 1 2 2), (-4 0 0 4 4),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-6 -8 5 7) is a linear combination of the vectors

(2 0 -1 -1), (0 -2 1 0), (-1 2 1 2), (-2 -1 1 0), (-3 1 2 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & -2 & -1 \\ -1 & 2 & 0 \\ 1 & -1 & 1 \end{pmatrix}^{-1} . X - \begin{pmatrix} 1 & -1 & -1 \\ 2 & -1 & -1 \\ 0 & -1 & 0 \end{pmatrix} = \begin{pmatrix} 1 & 0 & -4 \\ -1 & 0 & -2 \\ -1 & 2 & 2 \end{pmatrix}$$

1) $\begin{pmatrix} 1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & 1 & 1 & 0 \\ -1 & 1 & -1 & -1 \\ 2 & -1 & a & 1 \\ 0 & 0 & 2 & 1 \end{pmatrix}$ has determinant -4?

1) -5 2) -3 3) -4 4) 4 5) 0

Exercise 6

Find the solution of the linear system

$$-3x_1 + 5x_2 - 3x_4 - 4x_5 - 2x_6 == 6$$
$$x_1 - 2x_2 - 5x_3 + x_4 + 2x_5 + x_6 == 0$$
$$-x_1 + 4x_2 - 5x_3 + x_4 + 3x_5 + x_6 == 3$$
$$-x_1 - x_2 - 3x_4 - 5x_5 - 2x_6 == 3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 3 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -10 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ 1 \\ ? \\ ? \\ ? \end{pmatrix}$

3) $\begin{pmatrix} ? \\ ? \\ -3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ -3 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -9 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -11 \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ 1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -2 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -5 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -1 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} -9 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ 1 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -2 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ 8 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -4 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	15K	5K	12K
Feed of company 2	21K	7K	17K
Feed of company 3	19K	6K	15K
Feed of company 4	17K	4K	12K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
38K	12K	30K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 4 to be equal to 0.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

2) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

5) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 6548030

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 2 & 3 & 0 & -3 \\ 1 & 2 & 0 & -2 \\ 0 & -1 & 1 & 1 \\ -2 & -4 & 2 & 5 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -5 & -3 & -1 \\ -1 & ? & 1 & 0 \\ -2 & 5 & ? & 2 \\ -1 & 2 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -5 & 3 & 0 \\ -1 & ? & -5 & 1 \\ -3 & 4 & ? & -1 \\ 0 & 1 & -2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & 0 & 0 \\ 1 & ? & -2 & 1 \\ -1 & 2 & ? & 0 \\ 2 & -2 & -2 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 0 & 0 \\ -1 & ? & 1 & 2 \\ 0 & 0 & ? & 0 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & -1 \\ -2 & ? & 2 & -4 \\ 0 & -1 & ? & 0 \\ 1 & -1 & -2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 2 & -3 \\ -3 & ? & 4 & -3 \\ -2 & -1 & ? & -2 \\ -2 & -2 & 3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 2 & -1 \\ -2 & ? & -1 & 1 \\ -2 & 3 & ? & 0 \\ 2 & -3 & 2 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 0 -2 -1), (0 -1 -1 -1), (-2 1 0 -2),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (9 1 6) is a linear combination of the vectors

(-3 -1 -3), (-1 -1 -2), (-2 0 -1), (-4 0 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} -4 & 1 \\ -5 & 1 \end{pmatrix} . X . \begin{pmatrix} -1 & -1 \\ 3 & 2 \end{pmatrix}^{-1} = \begin{pmatrix} 15 & 6 \\ 20 & 8 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & -2 & 2 & 1 \\ 0 & 0 & 1 & 0 \\ -2 & a & 1 & 0 \\ 1 & 1 & -2 & -2 \end{pmatrix}$ has determinant -9?

1) 1 2) 3 3) -5 4) -3 5) 0

Exercise 6

Find the solution of the linear system

$$-3x_1 - x_2 + 9x_3 - 2x_4 == 3$$
$$5x_1 - 2x_2 - 4x_3 + x_4 == 0$$
$$-2x_1 + 3x_2 - 5x_3 + x_4 == -3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 10 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 2 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -2 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 1 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -10 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -34 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 24 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -6 \end{pmatrix}$

4) $\begin{pmatrix} ? \\ 0 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -33 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 22 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} 2 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -34 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 19 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	1K	3K	0K	4K
vegetable flours	4K	1K	1K	3K
fish flours	4K	2K	1K	4K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
20K	24K	29K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 10.

1) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

3) Feed 1=4, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 7476889

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} -1 & 2 & 1 & 0 \\ 0 & 2 & 0 & 1 \\ -2 & -1 & 1 & -1 \\ 2 & 0 & -1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -7 & 2 & 5 \\ 2 & ? & -1 & -1 \\ 1 & 2 & ? & -2 \\ -1 & -1 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & 0 & 1 \\ 0 & ? & -1 & -1 \\ 2 & -1 & ? & 3 \\ 0 & 1 & 2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -4 & -2 & 3 \\ 1 & ? & 1 & 0 \\ 0 & 1 & ? & -1 \\ -1 & 1 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 1 & 0 \\ 0 & ? & -2 & 0 \\ 1 & -5 & ? & 0 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -1 & -1 \\ -1 & ? & -1 & 1 \\ 1 & -2 & ? & -1 \\ 0 & -1 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -1 & 0 \\ 1 & ? & -1 & -1 \\ -3 & 2 & ? & 0 \\ 5 & -3 & -3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 0 & -3 \\ 2 & ? & -2 & -3 \\ -1 & 1 & ? & 2 \\ 1 & 0 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 -2 0 -2), (-1 2 -2 -1), (-2 0 2 -2),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (-2 2 -2) is a linear combination of the vectors

(-4 4 -4), (-2 2 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}^{-1} \cdot \left(X + \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix} \right) = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & 0 & 0 & -2 \\ 0 & 1 & 1 & 1 \\ 1 & 2 & 1 & a \\ 1 & 1 & 2 & 2 \end{pmatrix}$ has determinant -4?

1) 0 2) 1 3) 4 4) -4 5) 2

Exercise 6

Find the solution of the linear system

$$10\,x_1 - 10\,x_2 - 10\,x_3 - x_4 + 2\,x_5 == -2$$
$$-2\,x_1 + 5\,x_2 + 2\,x_3 + 2\,x_4 - 3\,x_5 == 2$$
$$4\,x_1 + 5\,x_2 - 4\,x_3 + 5\,x_4 - 7\,x_5 == 4$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -21 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 17 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 16 \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} -3 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -25 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 19 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 27 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ 0 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -18 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 20 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 18 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -6 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -5 \end{pmatrix}, \begin{pmatrix} -7 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 7 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 9 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ 2 \\ ? \\ ? \end{pmatrix}$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	2K	1K	0K
Feed of company 2	33K	19K	2K
Feed of company 3	12K	7K	1K
Feed of company 4	33K	19K	3K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
172K	99K	12K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

2) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

5) Feed 1=?, Feed 2=2, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 7511947

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 1 & -1 & -1 \\ 0 & -1 & 2 & 1 \\ 0 & 0 & 1 & 0 \\ -1 & -2 & 1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 1 & -1 & 0 \\ -1 & ? & 0 & -1 \\ 0 & 0 & ? & 0 \\ -1 & 1 & -2 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & 0 & 0 \\ 0 & ? & 1 & 2 \\ 0 & -4 & ? & 3 \\ 0 & 2 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & 1 & -2 \\ -1 & ? & 1 & -3 \\ 0 & -2 & ? & -1 \\ 1 & 0 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 2 & -3 \\ 2 & ? & 5 & -5 \\ 0 & 1 & ? & 1 \\ 1 & 1 & 2 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -1 & 1 \\ 0 & ? & 1 & 1 \\ 1 & -2 & ? & 1 \\ 1 & -2 & -2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 0 & -1 \\ 0 & ? & 0 & 1 \\ 0 & -1 & ? & 0 \\ -1 & 0 & -1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 0 & 0 \\ 3 & ? & -1 & -2 \\ -1 & -1 & ? & 1 \\ -2 & 0 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 2 -2 1), (2 -2 -2 1), (-1 -2 1 -2), (-1 -1 -2 0),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (2 -2 -3) is a linear combination of the vectors

(-1 2 0), (0 -2 -1), (-1 2 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 0 & -1 \\ 1 & 3 \end{pmatrix} \cdot \left(X + \begin{pmatrix} 1 & 1 \\ -1 & 0 \end{pmatrix} \right) = \begin{pmatrix} 0 & 1 \\ 0 & -2 \end{pmatrix}$

1) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 0 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & 1 & 1 & 1 \\ 1 & 0 & 1 & 0 \\ a & 0 & 1 & -1 \\ 0 & 0 & -2 & 1 \end{pmatrix}$ has determinant 4?

1) 5 2) -2 3) 3 4) 1 5) -4

Exercise 6

Find the solution of the linear system

$$-4\,x_1 - 4\,x_2 + 5\,x_3 + 3\,x_4 == -2$$
$$-4\,x_1 + 3\,x_2 + 3\,x_3 + 2\,x_4 == 3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ -13 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -4 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -27 \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ 1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -8 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -9 \end{pmatrix} + \left\langle \begin{pmatrix} -9 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ -11 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 10 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 20 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ -14 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 9 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -24 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	3K	19K	5K
Feed of company 2	4K	27K	7K
Feed of company 3	1K	7K	2K
Feed of company 4	3K	22K	6K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
43K	290K	77K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 16.

1) Feed 1=?, Feed 2=?, Feed 3=3, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

3) Feed 1=4, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=4, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 7803104

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 2 & 1 & -1 & -1 \\ 1 & 4 & 1 & 0 \\ 1 & 3 & 1 & 0 \\ -1 & 0 & 1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -11 & -7 & 1 \\ -2 & ? & 5 & -2 \\ -2 & 11 & ? & -2 \\ 5 & -22 & -14 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & 1 & 1 \\ 0 & ? & -1 & 0 \\ -1 & -2 & ? & -1 \\ 2 & 1 & -2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -4 & 3 & -3 \\ 11 & ? & -2 & 3 \\ 8 & 2 & ? & 2 \\ -15 & -4 & 3 & ? \end{pmatrix}$ 4)
$\begin{pmatrix} ? & -3 & -5 & 3 \\ 2 & ? & 5 & -3 \\ -3 & -1 & ? & 2 \\ -4 & -5 & -8 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & -1 \\ -1 & ? & -2 & 0 \\ 0 & 1 & ? & 2 \\ 1 & 0 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 0 & 0 \\ -1 & ? & -4 & -1 \\ 0 & 2 & ? & -1 \\ -1 & 2 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 0 & 0 \\ 0 & ? & 1 & 1 \\ 1 & -2 & ? & 2 \\ 0 & 0 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 -1 -2 1), (1 -2 0 0), (-1 0 1 0),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (-4 -8 -5) is a linear combination of the vectors

(0 -2 0), (-1 1 0), (0 -1 0), (1 -2 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X + \begin{pmatrix} 1 & 0 \\ -4 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 1 \\ -2 & -1 \end{pmatrix}^{-1} = \begin{pmatrix} -1 & -1 \\ 8 & 6 \end{pmatrix}$

1) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 2 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix
$\begin{pmatrix} -1 & 0 & 1 & 0 \\ -1 & 0 & 2 & 1 \\ 2 & -2 & 0 & 1 \\ 2 & a & 1 & 1 \end{pmatrix}$ has determinant 7?

1) 1 2) 0 3) 3 4) -3 5) 2

Exercise 6

Find the solution of the linear system

$$2x_1 - 8x_3 - 4x_4 - 8x_5 == 8$$
$$x_1 + x_2 + 4x_4 + 4x_5 == 0$$
$$-2x_1 - x_2 + 4x_3 - 2x_4 == -4$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ 6 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -6 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -4 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 3 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 6 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -10 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ -2 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -7 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -4 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -11 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ 0 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 2 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} 6 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 5 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 1 \\ ? \end{pmatrix}, \begin{pmatrix} 4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	7K	15K	10K
Feed of company 2	3K	6K	4K
Feed of company 3	3K	8K	5K
Feed of company 4	5K	12K	8K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
56K	133K	87K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

2) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=3

5) Feed 1=?, Feed 2=?, Feed 3=5, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 8623226

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 2 & -1 & -2 \\ 0 & 0 & 1 & -2 \\ 0 & 1 & 0 & 0 \\ 1 & 2 & -2 & -1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -8 & -6 & -1 \\ 1 & ? & 4 & 1 \\ 1 & 7 & ? & 2 \\ 0 & -5 & -4 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & -1 & 0 \\ 0 & ? & 1 & 0 \\ 1 & -3 & ? & 1 \\ 3 & -6 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & -2 & -1 \\ 0 & ? & 0 & 0 \\ 1 & -1 & ? & 0 \\ -2 & 3 & 1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -3 & -2 & -4 \\ 0 & ? & 1 & 0 \\ 2 & -1 & ? & -2 \\ 1 & -1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -1 & -1 \\ 1 & ? & -1 & -1 \\ 0 & -1 & ? & 0 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 0 & 1 \\ 2 & ? & 0 & -1 \\ 2 & 2 & ? & 1 \\ -3 & -4 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 1 & 0 \\ 1 & ? & 0 & -2 \\ 0 & 0 & ? & 2 \\ 0 & 0 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(1 2 2 -1), (-4 0 0 -4), (-1 1 -2 -2), (-2 0 0 -2), (-3 -2 -2 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-1 1 0) is a linear combination of the vectors

(-1 1 0), (-2 2 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 3 & 5 \\ -5 & -8 \end{pmatrix}.X + \begin{pmatrix} 1 & 0 \\ -1 & 1 \end{pmatrix} = \begin{pmatrix} 6 & 5 \\ -9 & -7 \end{pmatrix}$

1) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 2 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * \\ -1 & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & a & 1 & -2 \\ 1 & 0 & 1 & 0 \\ -1 & 1 & 0 & 1 \\ 1 & 0 & 1 & -1 \end{pmatrix}$ has determinant 0?

1) -4 2) 5 3) -2 4) 1 5) 0

Exercise 6

Find the solution of the linear system

$$3\,x_1 - 2\,x_2 - 2\,x_3 + 3\,x_4 + 5\,x_5 == 1$$
$$4\,x_1 + x_3 - 5\,x_4 - 8\,x_5 == -3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 3 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 4 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -1 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -2 \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 2 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -24 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -14 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -12 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -4 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -27 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -16 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -11 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -1 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -7 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ 1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -26 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -15 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 10 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	17K	17K	13K	3K
vegetable flours	9K	10K	7K	2K
fish flours	4K	5K	3K	1K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
62K	36K	17K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 8.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

3) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=5

5) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 8792788

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 4 & 3 & -1 & -3 \\ 1 & 1 & -1 & 0 \\ 2 & 2 & -1 & -1 \\ -1 & -1 & 1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 2 & -2 & 1 \\ -1 & ? & 3 & 0 \\ 0 & -1 & ? & 1 \\ 0 & 1 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & -2 & 0 \\ 2 & ? & 1 & -3 \\ 1 & 0 & ? & -1 \\ -1 & 1 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & -2 & 2 \\ -3 & ? & 1 & -1 \\ -4 & 1 & ? & -1 \\ 8 & -3 & -3 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & 1 & 0 \\ -2 & ? & -4 & -2 \\ 0 & 3 & ? & -1 \\ 1 & -4 & 1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 2 & 0 \\ -1 & ? & 0 & 2 \\ 0 & -1 & ? & -1 \\ 0 & 1 & -2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & 0 & 0 \\ 0 & ? & 0 & 1 \\ 1 & 0 & ? & 1 \\ -1 & 0 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & 0 \\ 2 & ? & -1 & -1 \\ -2 & 0 & ? & 1 \\ 1 & 0 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(1 -1 1 1), (1 -1 1 2), (0 1 -2 0), (-1 -2 -2 2),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (-4 -3 5) is a linear combination of the vectors

(-1 2 -1), (1 -2 2), (1 0 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 0 & 1 \\ -1 & 2 \end{pmatrix} \cdot \left(X - \begin{pmatrix} -1 & 4 \\ -1 & 3 \end{pmatrix} \right) = \begin{pmatrix} 2 & -3 \\ 4 & -1 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 0 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 0 & -1 & 2 \\ 1 & 1 & 0 & 1 \\ 0 & -1 & -1 & 2 \\ -2 & a & 1 & 1 \end{pmatrix}$ has determinant -2?

1) 4 2) 0 3) -5 4) -3 5) 1

Exercise 6

Find the solution of the linear system

$$-6\,x_1 + 2\,x_2 + x_3 - 2\,x_4 + 7\,x_5 == 9$$
$$-3\,x_1 + 5\,x_2 - x_4 + 4\,x_5 == 5$$
$$-3\,x_1 - 3\,x_2 + x_3 - x_4 + 3\,x_5 == 4$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -8 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 4 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ 5 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 2 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} 1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 3 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -28 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 2 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -1 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -2 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -9 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 4 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} -2 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 9 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -2 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	9K	6K	1K
Feed of company 2	8K	6K	1K
Feed of company 3	1K	1K	0K
Feed of company 4	13K	8K	2K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
110K	72K	15K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

2) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

4) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=4

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 9214549

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & -2 & 1 & 2 \\ 0 & 0 & -1 & 0 \\ -1 & 3 & 0 & -2 \\ 0 & -1 & -1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -6 & 3 & 3 \\ 2 & ? & 1 & 1 \\ 0 & -4 & ? & 0 \\ -3 & 5 & -2 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -5 & -9 & 6 \\ 0 & ? & 6 & -5 \\ -1 & 2 & ? & -2 \\ 1 & -2 & -4 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -4 & 7 & 0 \\ 7 & ? & 10 & 0 \\ -3 & 2 & ? & 0 \\ -2 & 3 & -5 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 3 & 0 & -2 \\ 1 & ? & 1 & 0 \\ 0 & -1 & ? & 0 \\ 1 & 0 & 1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & 0 & 1 \\ -1 & ? & 0 & 0 \\ 0 & 0 & ? & 0 \\ 1 & -2 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -2 & 2 & -1 \\ 1 & ? & -5 & 3 \\ 0 & 1 & ? & 1 \\ 1 & 2 & -2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & -1 & -2 \\ -4 & ? & -3 & -5 \\ -1 & -1 & ? & -2 \\ 4 & 3 & 4 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 -2 -1 -1 -1), (-4 -4 4 0 0), (-1 -1 4 2 -1), (-2 -2 2 0 0), (1 1 2 2 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-4 -8 7 -5) is a linear combination of the vectors

(1 0 0 2), (1 -1 1 -1), (0 2 -2 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} -1 & -2 & 2 \\ 0 & 1 & 0 \\ -1 & -2 & 1 \end{pmatrix}.X.\begin{pmatrix} -1 & 1 & -2 \\ -1 & 2 & -3 \\ 2 & -1 & 2 \end{pmatrix}^{-1} = \begin{pmatrix} 11 & -3 & 5 \\ -1 & 0 & -1 \\ 8 & -2 & 4 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & -2 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ -2 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & -1 & 0 & 2 \\ a & 2 & 0 & 1 \\ 0 & -3 & 2 & 3 \\ 2 & -2 & 1 & 2 \end{pmatrix}$ has determinant -14?

1) 5 2) 0 3) -3 4) 3 5) -1

Exercise 6

Find the solution of the linear system

$$-2\,x_1 + x_2 == 4$$
$$2\,x_1 + x_2 + 5\,x_3 == -5$$
$$-x_1 - x_2 - 4\,x_3 == 3$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ 2 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -5 \\ ? \end{pmatrix}, \begin{pmatrix} 9 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ 1 \\ ? \end{pmatrix}$

3) $\begin{pmatrix} 9 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 3 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -2 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -4 \end{pmatrix}, \begin{pmatrix} 7 \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ 4 \\ ? \end{pmatrix}$

5) $\begin{pmatrix} ? \\ 2 \\ ? \end{pmatrix}$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	45K	69K	77K
Feed of company 2	28K	46K	50K
Feed of company 3	46K	71K	79K
Feed of company 4	30K	47K	52K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
310K	488K	539K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

3) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

5) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 9810258

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 0 & 1 & 3 & -2 \\ -1 & 0 & -1 & 0 \\ 2 & 1 & 0 & 1 \\ 2 & 0 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -4 & -1 & 1 \\ 2 & ? & 1 & -1 \\ 0 & 2 & ? & -1 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & 2 & 0 \\ 0 & ? & -1 & 0 \\ 0 & 0 & ? & 0 \\ 1 & -3 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & 3 & -1 & 3 \\ 0 & ? & 1 & -1 \\ -1 & -4 & ? & -3 \\ -2 & -6 & 2 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & -3 & -2 \\ -1 & ? & -1 & 0 \\ -1 & 1 & ? & 0 \\ 0 & 0 & 2 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & -1 & 0 \\ -2 & ? & 0 & 1 \\ 3 & -1 & ? & -1 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & -1 & 0 \\ -1 & ? & 1 & 0 \\ 1 & 1 & ? & -2 \\ 1 & -1 & 2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -1 & 1 \\ 0 & ? & -1 & -1 \\ 1 & -1 & ? & 2 \\ 0 & 1 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 1 -2 1), (-4 -2 -4 -4), (-2 -1 -2 -2), (1 2 2 1),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (-6 -4 2) is a linear combination of the vectors

(1 -2 -1), (2 0 -1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} -2 & -1 \\ -3 & -2 \end{pmatrix}.X - \begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & -4 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 2 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 0 & -1 & -2 \\ 0 & 0 & 1 & -1 \\ -1 & 1 & -2 & a \\ 1 & 1 & 0 & -2 \end{pmatrix}$ has determinant -1?

1) 2 2) 0 3) 3 4) 5 5) -2

Exercise 6

Find the solution of the linear system

$$-5\,x_1 - 2\,x_2 - 7\,x_3 - 4\,x_4 == -9$$
$$-5\,x_1 - x_2 - 2\,x_3 - x_4 == -3$$
$$5\,x_1 - 3\,x_3 - 2\,x_4 == -3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ -5 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 27 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 0 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ -10 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 5 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 0 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -10 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -2 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ 2 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 8 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 9 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -3 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} -3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 28 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 0 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -15 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -2 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	4K	2K	3K
Feed of company 2	6K	3K	4K
Feed of company 3	11K	6K	9K
Feed of company 4	2K	2K	4K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
42K	26K	43K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

2) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

5) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 12865294

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & -4 & -2 & -3 \\ -1 & 14 & 7 & 10 \\ 0 & 9 & 5 & 7 \\ 0 & 4 & 2 & 3 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 0 & 0 & 1 \\ 1 & ? & -1 & 0 \\ 1 & 1 & ? & -7 \\ -2 & -2 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -6 & 2 & 0 \\ 6 & ? & 2 & 1 \\ 0 & 1 & ? & -1 \\ 5 & -7 & 2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & 0 & -1 \\ 1 & ? & 0 & 1 \\ 0 & 1 & ? & 0 \\ -1 & -2 & 0 & ? \end{pmatrix}$ 4)
$\begin{pmatrix} ? & -2 & -2 & 1 \\ -1 & ? & 1 & -1 \\ -2 & 2 & ? & -1 \\ -3 & 3 & 4 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & -1 & 3 \\ -4 & ? & 2 & -4 \\ -1 & 0 & ? & -1 \\ 3 & -2 & -2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -2 & 0 & 0 \\ 0 & ? & 1 & 0 \\ -1 & 2 & ? & 0 \\ 1 & -2 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & -3 & -1 \\ -3 & ? & 5 & -1 \\ 0 & 0 & ? & 0 \\ 0 & 0 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 -2 1 2 0), (0 0 1 0 -1), (2 0 0 0 -2), (-3 1 1 -2 0), (-1 1 1 -2 -2),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-4 -4 -6 1) is a linear combination of the vectors

(0 0 -2 -1), (1 1 -2 -2), (0 0 1 0), (-1 -1 3 2), (0 0 -4 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 2 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 0 & 0 \end{pmatrix}.X - \begin{pmatrix} 4 & 2 & 1 \\ 2 & 1 & 1 \\ 3 & 1 & 1 \end{pmatrix} = \begin{pmatrix} -6 & -3 & 1 \\ -1 & 0 & 0 \\ -2 & 0 & -2 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & -2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 1 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} a & 1 & -2 & 1 \\ -1 & 0 & 0 & 1 \\ 2 & 1 & 0 & 1 \\ -1 & 2 & 1 & 1 \end{pmatrix}$ has determinant -19?

1) -5 2) -3 3) 0 4) -1 5) -4

Exercise 6

Find the solution of the linear system

$$4\,x_1 + 4\,x_2 - x_3 - 5\,x_4 == 4$$
$$x_1 + x_2 + 4\,x_4 + 4\,x_5 == 5$$
$$x_1 + 2\,x_3 + 5\,x_5 == -5$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -20 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -15 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ 6 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 6 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -2 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -24 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -18 \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -46 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -31 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ -8 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 8 \\ ? \end{pmatrix}, \begin{pmatrix} 5 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 3 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -6 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	11K	3K	20K
Feed of company 2	3K	1K	5K
Feed of company 3	7K	2K	13K
Feed of company 4	11K	3K	18K

The experts of the livestock farm determined
that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
79K	22K	144K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 1 to be equal to 5.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

2) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

3) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 13082921

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & -2 & 1 & 0 \\ 1 & -1 & 1 & 0 \\ -1 & -4 & 2 & 2 \\ 0 & -2 & 1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -4 & -2 & 0 \\ -1 & ? & 1 & 0 \\ -3 & 3 & ? & 0 \\ -1 & 0 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -4 & 0 & 3 \\ 0 & ? & -1 & -7 \\ -1 & -4 & ? & 3 \\ 1 & 7 & -2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & 0 & -1 & 2 \\ -1 & ? & 0 & 0 \\ -1 & 2 & ? & -2 \\ -1 & 0 & -1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -3 & -2 & 2 \\ 0 & ? & -1 & 0 \\ 1 & -1 & ? & 1 \\ 1 & 0 & -1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & -4 & -3 \\ -1 & ? & -1 & 1 \\ 0 & 1 & ? & 1 \\ 1 & -1 & -2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -2 & 1 & 0 \\ 0 & ? & -1 & -1 \\ 0 & -1 & ? & -1 \\ -3 & 2 & 1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -2 & 2 & -3 \\ 2 & ? & -2 & 1 \\ 2 & 1 & ? & 2 \\ -1 & 0 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-1 0 2 -2 0), (2 2 2 -2 0), (0 -2 1 1 1), (1 -2 0 1 -2), (-1 2 -1 2 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-1 -5 0 -5) is a linear combination of the vectors

(0 2 -1 2), (-1 -1 -2 -1), (-2 -2 -4 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 2 & 1 & -1 \\ 1 & 1 & 0 \\ 2 & 1 & 0 \end{pmatrix} . \left(X - \begin{pmatrix} 1 & -1 & 0 \\ 0 & 1 & 0 \\ 0 & -1 & 1 \end{pmatrix} \right) = \begin{pmatrix} -1 & 4 & 1 \\ -1 & 2 & 1 \\ -1 & 4 & 1 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 0 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & 1 & 0 & a \\ 0 & 1 & 0 & -2 \\ 0 & 1 & -1 & -1 \\ 1 & 0 & -1 & -2 \end{pmatrix}$ has determinant 2?

1) -4 2) 1 3) 0 4) 2 5) 3

Exercise 6

Find the solution of the linear system

$$x_1 - 2\,x_2 + 2\,x_3 - 2\,x_4 - x_5 - 4\,x_6 == 5$$
$$-x_1 - 2\,x_2 + 3\,x_3 + 5\,x_4 - 3\,x_6 == -2$$
$$-x_2 + x_3 + 4\,x_4 - x_5 - 5\,x_6 == -4$$
$$-4\,x_1 + x_2 + x_3 + 10\,x_4 + 3\,x_5 + 7\,x_6 == -10$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ 26 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 13 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -1 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -7 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ 2 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 15 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 0 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -11 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -4 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -4 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 5 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 13 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -18 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ 1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	9K	19K	6K
Feed of company 2	6K	13K	4K
Feed of company 3	8K	11K	6K
Feed of company 4	13K	24K	9K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
83K	143K	59K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 4 to be equal to 1.

1) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

2) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

3) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=4, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 21055224

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 0 & -1 & 0 & -1 \\ 0 & 2 & -2 & 1 \\ 0 & 0 & 1 & 0 \\ 1 & -2 & 1 & 0 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -9 & 7 & -11 \\ 0 & ? & -3 & 4 \\ 0 & 2 & ? & 4 \\ 0 & 1 & -1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & -2 & 1 \\ -2 & ? & 2 & -1 \\ -2 & 2 & ? & -1 \\ 1 & -2 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & 2 & 3 & 1 \\ 1 & ? & 2 & 0 \\ 0 & 0 & ? & 0 \\ -2 & -1 & -2 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & 0 & -1 \\ 0 & ? & 0 & 0 \\ 1 & 0 & ? & 0 \\ 1 & 1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & -1 \\ 2 & ? & 2 & -3 \\ 0 & -1 & ? & -1 \\ -1 & 0 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 2 & -3 \\ -4 & ? & -5 & 6 \\ 2 & -1 & ? & -5 \\ 5 & -4 & 5 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 4 & 0 \\ 1 & ? & 2 & -1 \\ 1 & 0 & ? & 0 \\ 0 & 0 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 0 1 1), (0 -1 -1 2), (-2 2 -1 1),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (-4 -9 -8) is a linear combination of the vectors

(-1 -2 2), (0 1 -2), (-2 -3 4), (-2 -4 4), (-1 -1 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 12 & -5 \\ -7 & 3 \end{pmatrix}.X.\begin{pmatrix} -1 & 1 \\ -1 & 0 \end{pmatrix}=\begin{pmatrix} 34 & -17 \\ -20 & 10 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * \\ -2 & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 2 & 1 & -1 \\ 1 & a & -2 & -1 \\ 0 & 2 & 0 & 1 \\ 0 & 0 & -1 & -2 \end{pmatrix}$ has determinant -13?

1) -1 2) -2 3) 2 4) 1 5) 5

Exercise 6

Find the solution of the linear system

$x_1 + 12\,x_3 - 5\,x_4 == -2$
$x_1 - 3\,x_2 - 7\,x_3 + 3\,x_4 == 2$

taking as parameters, if it is necessary, the
first variables and solving for the last ones (that is to say,
apply Gauss elimination technique selecting columns from right to left)
. Express the solution by means of linear combinations.

1) $\begin{pmatrix} -1 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -10 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 18 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 2 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -5 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 17 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ -9 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -9 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 5 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -8 \end{pmatrix}$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ 10 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -19 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 15 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different
proportions as we can see in the table below which indicates the amount of
kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	0K	4K	1K	3K
vegetable flours	0K	2K	1K	2K
fish flours	1K	1K	0K	1K

The experts of the livestock farm determined
that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
29K	18K	9K

How many sacks of every company are necessary to reach the
recommended composition taking into account that, to properly store the
feed, the total number of sacks for every animal has to be equal to 13.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

2) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=3

4) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 26052770

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 0 & -2 & -1 & 4 \\ -1 & 0 & -1 & 1 \\ -1 & 2 & -1 & -2 \\ 0 & -1 & 1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -4 & 1 & 2 \\ 1 & ? & 1 & 1 \\ 1 & -2 & ? & 0 \\ 0 & 1 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & -1 & -1 \\ -1 & ? & 0 & 1 \\ 0 & 2 & ? & 0 \\ 0 & 1 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & 0 & -3 \\ 0 & ? & 0 & 1 \\ 2 & -3 & ? & -3 \\ -1 & 0 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 1 & 0 \\ 3 & ? & 5 & 3 \\ 1 & -2 & ? & 2 \\ 2 & -3 & 3 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & 2 & 3 \\ -4 & ? & -2 & -5 \\ 0 & 0 & ? & -1 \\ -1 & 1 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -2 & 1 \\ 0 & ? & 1 & -2 \\ 0 & 1 & ? & -1 \\ 0 & 1 & 1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & -1 & -1 \\ 2 & ? & -1 & -3 \\ -1 & 1 & ? & 1 \\ 0 & 1 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 1 1 0 -2), (1 -2 1 -2 1), (1 -1 2 -1 1)
, (-4 2 2 0 -4), (2 2 -2 0 0), (-3 3 0 2 -3),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5 6) 6

Exercise 3

Check whether the vector (n-tuple) (2 -4 2 -4) is a linear combination of the vectors

(1 -2 1 -2), (0 0 0 -3), (0 0 0 3), (1 -2 1 1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 0 & -1 \\ -1 & 1 & -3 \\ 0 & 0 & 1 \end{pmatrix}.X + \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ -2 & 1 & -1 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 3 \\ 1 & 0 & 1 \\ -2 & 1 & -2 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & -1 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -2 & 1 & 1 & 0 \\ a & -1 & 1 & 0 \\ 2 & -2 & -1 & 0 \\ 2 & 0 & 1 & -1 \end{pmatrix}$ has determinant 4?

1) -5 2) -3 3) 2 4) 3 5) 0

Exercise 6

Find the solution of the linear system

$5\,x_1 - 4\,x_2 - 2\,x_3 - 7\,x_4 == 5$
$-4\,x_2 - x_3 - 7\,x_4 == -4$
$2\,x_1 - x_2 - 2\,x_4 == 3$

taking as parameters, if it is necessary, the
first variables and solving for the last ones (that is to say,
apply Gauss elimination technique selecting columns from right to left)
. Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ 47 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -24 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ -22 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 14 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} -4 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -4 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -1 \\ ? \end{pmatrix}, \begin{pmatrix} 4 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} 3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -5 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -4 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ -11 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -21 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different
proportions as we can see in the table below which indicates the amount of
kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	2K	2K	3K
Feed of company 2	0K	1K	1K
Feed of company 3	0K	4K	4K
Feed of company 4	3K	3K	5K

The experts of the livestock farm determined
that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
23K	28K	42K

How many sacks of every company are necessary to reach the
recommended composition taking into account that, to properly store the
feed, the total number of sacks for every animal has to be equal to 14.

1) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=4, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=4

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 26256869

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & -1 & -1 & 0 \\ 0 & 1 & 1 & -1 \\ 0 & 0 & 1 & 0 \\ -1 & 1 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -4 & -5 & 6 \\ 0 & ? & -1 & 2 \\ 0 & 1 & ? & -1 \\ 2 & -4 & -4 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 1 & 1 & 1 \\ 1 & ? & 0 & 1 \\ 0 & 0 & ? & 0 \\ 1 & 0 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & -6 & 12 \\ -4 & ? & 7 & -16 \\ -1 & 1 & ? & -5 \\ -1 & 1 & 4 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 5 & 2 \\ 8 & ? & 12 & 5 \\ -9 & 5 & ? & -6 \\ 11 & -6 & 17 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -2 & 2 \\ 0 & ? & 1 & -1 \\ 1 & -1 & ? & -1 \\ -1 & 2 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -1 & 1 \\ 1 & ? & -1 & 1 \\ 0 & 0 & ? & -1 \\ -1 & 1 & 1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 9 & 4 \\ -7 & ? & -13 & -6 \\ -2 & 1 & ? & -2 \\ 3 & -1 & 6 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 -1 -1 0 0), (-1 2 -1 -2 1), (-1 2 -2 -1 0), (0 -1 -2 0 -1),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (4 -1 -6 1) is a linear combination of the vectors

(2 -1 -2 1), (1 1 -4 0), (-3 3 0 -2), (-1 2 -2 -1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\left(X - \begin{pmatrix} 1 & -2 & -2 \\ 0 & -1 & -2 \\ 1 & 0 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} -1 & -2 & -1 \\ 1 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 2 & 3 & 4 \\ 0 & -1 & 2 \\ 1 & 1 & -1 \end{pmatrix}$$

1) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ 1 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 0 & 0 & -1 \\ 2 & 1 & a & 2 \\ 0 & -2 & -1 & 1 \\ 0 & 3 & 1 & -1 \end{pmatrix}$ has determinant 5?

1) 5 2) 1 3) -5 4) 3 5) -2

Exercise 6

Find the solution of the linear system

$$-6\,x_1 + 10\,x_2 + x_3 == 7$$
$$4\,x_1 - 7\,x_2 - x_3 == 0$$
$$4\,x_1 - 6\,x_2 - x_3 == 3$$
$$-3\,x_1 + 5\,x_2 + x_3 == -5$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ -1 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -1 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} -7 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 4 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 8 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ -14 \end{pmatrix}$

4) $\begin{pmatrix} ? \\ ? \\ -16 \end{pmatrix}$

5) $\begin{pmatrix} ? \\ ? \\ -17 \end{pmatrix}$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	9K	4K	6K
Feed of company 2	15K	7K	10K
Feed of company 3	5K	2K	4K
Feed of company 4	1K	0K	1K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
125K	55K	85K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 1 to be equal to 5.

1) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=5

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=3

4) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 26523012

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} -1 & 5 & 3 & 5 \\ -1 & 2 & 1 & 1 \\ -2 & 3 & 2 & 1 \\ 1 & 0 & 0 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -5 & -1 & 3 \\ -7 & ? & 2 & -6 \\ 0 & 0 & ? & 1 \\ -3 & 4 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -4 & -1 & 2 \\ 2 & ? & 0 & -6 \\ 1 & 10 & ? & -4 \\ -1 & -8 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & -2 & -3 \\ 1 & ? & -2 & -2 \\ 1 & -4 & ? & -1 \\ -1 & 1 & 1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & -3 & 0 \\ -2 & ? & -2 & 1 \\ 1 & 1 & ? & 0 \\ -1 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & -1 \\ 0 & ? & 1 & -1 \\ -1 & -3 & ? & 0 \\ 0 & 2 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 1 & 1 \\ -2 & ? & 1 & 1 \\ -2 & -1 & ? & 2 \\ -5 & -3 & 2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 9 & 2 \\ -3 & ? & -6 & -1 \\ 0 & 0 & ? & 0 \\ 4 & -1 & 9 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 -2 -1 2 1), (2 0 -2 1 -1), (-2 1 0 -1 0), (-2 2 2 0 2),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (-2 -8 -3 -5) is a linear combination of the vectors

(-3 -2 0 -2), (1 -2 -4 0), (-1 -2 -2 -1), (-2 -4 -4 -2), (2 0 -2 1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 2 \\ 4 & 2 & 7 \end{pmatrix}.X - \begin{pmatrix} 0 & -1 & 2 \\ 1 & 1 & -1 \\ 0 & 0 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 2 & -2 \\ 2 & 1 & 2 \\ 9 & 6 & 2 \end{pmatrix}$$

1) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * \\ -1 & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ 0 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 2 & 0 & 1 & 2 \\ -2 & 1 & 0 & 0 \\ a & 1 & 0 & 1 \end{pmatrix}$ has determinant 1?

1) -4 2) 5 3) 3 4) 0 5) -3

Exercise 6

Find the solution of the linear system

$$6\,x_1 - 3\,x_2 + 5\,x_3 - 4\,x_4 - 5\,x_5 == -4$$
$$x_1 + x_3 + 5\,x_4 + 4\,x_5 == 5$$
$$2\,x_1 - x_2 + 2\,x_3 - x_4 + 3\,x_5 == -5$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 8 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 1 \end{pmatrix}, \begin{pmatrix} -6 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -2 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ 6 \\ ? \\ ? \end{pmatrix}$

3) $\begin{pmatrix} ? \\ ? \\ -11 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -5 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -1 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -14 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -13 \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -3 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -4 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 13 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	7K	7K	1K	2K
vegetable flours	6K	6K	1K	2K
fish flours	15K	15K	3K	7K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
67K	58K	147K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 2 to be equal to 5.

1) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

3) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

4) Feed 1=?, Feed 2=2, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 48143225

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 0 & -1 & 1 \\ 3 & 1 & -3 & 3 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -5 & -7 & 2 \\ 0 & ? & -3 & 1 \\ 0 & 0 & ? & 1 \\ 0 & -3 & -4 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & 2 & -1 \\ 1 & ? & 3 & -1 \\ 0 & -1 & ? & -1 \\ 1 & -5 & 5 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & -1 & 1 \\ -2 & ? & 2 & -2 \\ -1 & 2 & ? & -2 \\ -1 & -1 & -1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & 1 & -1 \\ -3 & ? & 0 & 0 \\ -1 & 0 & ? & 0 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & 1 \\ 1 & ? & 0 & 0 \\ 0 & 0 & ? & 0 \\ -1 & -2 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 1 & -3 \\ -1 & ? & 0 & -1 \\ 0 & -1 & ? & 0 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -1 & -1 \\ 2 & ? & 2 & 0 \\ 1 & 0 & ? & 0 \\ 0 & -1 & 3 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 -1 -2 -1), (-1 -1 0 -1), (0 2 2 0),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (5 7 5) is a linear combination of the vectors

(0 2 2), (0 4 4),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X - \begin{pmatrix} -1 & 2 \\ 0 & -1 \end{pmatrix}\right) \cdot \begin{pmatrix} 4 & -1 \\ -3 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} -1 & -2 \\ -1 & -1 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 0 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 2 & 0 & 2 & 1 \\ -1 & a & 1 & 1 \\ 1 & 0 & 2 & 0 \\ -1 & 1 & -1 & -1 \end{pmatrix}$ has determinant -9?

1) 4 2) -4 3) 2 4) -5 5) 0

Exercise 6

Find the solution of the linear system

$$2x_1 + 5x_2 + 3x_3 + 4x_4 - x_5 == 3$$
$$-4x_1 - 7x_2 + 2x_3 - 7x_4 + 2x_5 == -8$$
$$-2x_1 - 2x_2 + 5x_3 - 3x_4 + x_5 == -5$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -4 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -5 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -8 \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -8 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 9 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 5 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ 3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 1 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -26 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ 3 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -28 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	9K	17K	24K
Feed of company 2	3K	4K	9K
Feed of company 3	7K	13K	19K
Feed of company 4	6K	11K	16K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
77K	140K	209K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

4) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=3, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 53956072

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 0 & 0 & -1 \\ -1 & 1 & 2 & -1 \\ -1 & 0 & 2 & 0 \\ 0 & 1 & -3 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -4 & 3 & -1 \\ 1 & ? & 2 & -1 \\ 1 & -3 & ? & -1 \\ 0 & 2 & -3 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & -1 & 1 \\ -1 & ? & 0 & 2 \\ 0 & -1 & ? & 2 \\ 2 & -3 & -2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & 5 & 2 \\ 3 & ? & 4 & 2 \\ 2 & -1 & ? & 1 \\ 3 & -2 & 5 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 1 & 2 \\ 1 & ? & -1 & -1 \\ -3 & -5 & ? & 4 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & 3 & 4 \\ -1 & ? & -2 & -3 \\ -3 & 3 & ? & 0 \\ 2 & -2 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -1 & -1 \\ -1 & ? & 2 & 0 \\ 1 & -1 & ? & 0 \\ 1 & 0 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 0 & -2 \\ 1 & ? & 0 & 0 \\ 1 & -1 & ? & -1 \\ 1 & 0 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 -2 0 -1), (-1 2 0 1), (0 1 2 -2),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (0 9 0) is a linear combination of the vectors

(0 -2 0), (0 -1 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 0 & -1 \\ 1 & 2 \end{pmatrix}.X - \begin{pmatrix} 0 & 1 \\ -1 & 2 \end{pmatrix} = \begin{pmatrix} 0 & -2 \\ 0 & 0 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 2 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & -1 & 0 & -2 \\ 0 & -1 & 1 & 0 \\ 0 & -2 & -1 & -1 \\ 1 & a & 0 & -1 \end{pmatrix}$ has determinant 11?

1) 3 2) 4 3) -4 4) -3 5) 0

Exercise 6

Find the solution of the linear system

$$5\,x_1 - 2\,x_2 + 2\,x_3 - 2\,x_4 - 3\,x_5 == 1$$
$$2\,x_1 - 4\,x_3 + 3\,x_4 + 4\,x_5 == 4$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -1 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 5 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -9 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 4 \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -8 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 17 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -3 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -5 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ 13 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 18 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 1 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -11 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -26 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 8 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -2 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	2K	0K	1K	1K
vegetable flours	4K	2K	3K	2K
fish flours	3K	0K	2K	2K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
6K	27K	12K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 11.

1) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=5, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 74540350

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 3 & 4 & 4 & -1 \\ 2 & 3 & 3 & -1 \\ -1 & -1 & 1 & -1 \\ -2 & -3 & -2 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -7 & 1 & -2 \\ -3 & ? & -1 & 1 \\ 0 & 1 & ? & 1 \\ -1 & 3 & -1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & 1 & 0 \\ -5 & ? & -2 & 0 \\ 4 & 0 & ? & 0 \\ -2 & 0 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 1 & 2 \\ -1 & ? & -1 & -1 \\ 1 & 0 & ? & 0 \\ -2 & 0 & 0 & ? \end{pmatrix}$ 4) $\begin{pmatrix} ? & -1 & 1 & 2 \\ 0 & ? & -1 & -1 \\ -1 & 2 & ? & 0 \\ -1 & 1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & -2 & 3 \\ 2 & ? & -2 & 0 \\ 1 & 0 & ? & 1 \\ 5 & 0 & -3 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & 0 & -1 \\ -5 & ? & -3 & -4 \\ -3 & -1 & ? & -2 \\ 6 & 2 & 4 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & -1 \\ -2 & ? & 0 & 1 \\ 1 & -2 & ? & -1 \\ -3 & 3 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 2 -2 0), (-4 -4 -2 0), (-2 -2 -1 0), (-2 -1 0 -2), (0 -1 2 1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-4 -3 -4) is a linear combination of the vectors

(1 2 1), (1 1 1), (0 -1 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} -1 & -2 \\ 1 & 1 \end{pmatrix}^{-1} \cdot X - \begin{pmatrix} 1 & 0 \\ 1 & 1 \end{pmatrix} = \begin{pmatrix} -4 & -2 \\ 1 & 0 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 2 & 0 & 1 & -1 \\ 2 & 1 & 1 & -1 \\ 2 & 0 & 1 & 0 \\ a & -1 & -2 & 1 \end{pmatrix}$ has determinant 4?

1) -5 2) 0 3) 1 4) 3 5) -4

Exercise 6

Find the solution of the linear system

$$-2\,x_1 + 3\,x_2 - x_3 - 2\,x_4 == 1$$
$$3\,x_1 - 8\,x_2 + 3\,x_3 + 5\,x_4 == 1$$
$$-x_1 - 2\,x_2 + x_3 + x_4 == 3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ -7 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 4 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ -9 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 2 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ 7 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -3 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 1 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -6 \end{pmatrix} + \left\langle \begin{pmatrix} 8 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -3 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -9 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -4 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} -1 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 3 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 3 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	4K	10K	45K	45K
vegetable flours	0K	1K	1K	3K
fish flours	1K	3K	12K	13K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
167K	7K	46K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 8.

1) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

3) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

5) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 75573701

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} -1 & -1 & 2 & -1 \\ 1 & 0 & -1 & 0 \\ -1 & 1 & -1 & 3 \\ -3 & -1 & 2 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & 0 & 0 \\ 4 & ? & 2 & -1 \\ 1 & -3 & ? & -1 \\ 2 & -3 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 3 & 3 & -2 \\ 1 & ? & 1 & -1 \\ 5 & 2 & ? & -2 \\ 3 & 2 & 2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & -3 & -1 \\ 0 & ? & 1 & 0 \\ -4 & 1 & ? & 1 \\ 0 & -1 & -1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & 1 & -1 \\ 0 & ? & -1 & 2 \\ -2 & -1 & ? & -1 \\ -1 & -1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & 0 \\ 0 & ? & -1 & -1 \\ 0 & -5 & ? & 4 \\ 1 & 0 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 11 & 3 \\ 2 & ? & -3 & -4 \\ 1 & 0 & ? & 1 \\ 0 & 0 & 2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -1 & -1 \\ 0 & ? & 1 & 0 \\ -1 & -1 & ? & 1 \\ 0 & 2 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 -1 1 0 1), (2 2 -2 1 1), (0 0 1 2 -1), (-1 0 1 2 -2),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (4 -4 -1 9) is a linear combination of the vectors

(-4 -2 2 0), (-2 -1 1 0), (1 -1 0 1), (0 1 2 -1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ 2 & -2 & 1 \end{pmatrix}.X + \begin{pmatrix} 1 & 0 & 0 \\ 3 & 1 & -1 \\ -1 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 1 \\ 5 & 1 & -3 \\ -4 & 0 & 4 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 1 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ -2 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 0 & 0 & -1 \\ a & 1 & 2 & 0 \\ -2 & 1 & 0 & 1 \\ 1 & -2 & 1 & 0 \end{pmatrix}$ has determinant 3?

1) 0 2) -5 3) 5 4) 4 5) -2

Exercise 6

Find the solution of the linear system

$$3x_1 - x_3 == -4$$
$$8x_1 - 5x_2 - 2x_3 == 1$$
$$-11x_1 + 7x_2 + 3x_3 == 1$$
$$-4x_1 + 2x_2 + x_3 == 0$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ 10 \end{pmatrix}$

2) $\begin{pmatrix} 1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -7 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -2 \\ ? \end{pmatrix}, \begin{pmatrix} 1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -2 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ -7 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 7 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} 3 \\ ? \\ ? \end{pmatrix}$

5) $\begin{pmatrix} ? \\ ? \\ 8 \end{pmatrix}$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	6K	13K	4K
Feed of company 2	7K	15K	4K
Feed of company 3	7K	16K	5K
Feed of company 4	4K	9K	3K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
66K	145K	44K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

3) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

5) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 77379111

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 0 & -1 & -1 & 0 \\ 1 & 4 & 3 & -1 \\ 0 & 0 & 1 & 0 \\ -1 & -4 & -6 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 2 & 4 & 1 \\ -1 & ? & -1 & 0 \\ 0 & 0 & ? & 0 \\ 0 & 1 & 3 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & -5 & -2 \\ 1 & ? & -2 & -1 \\ 0 & -1 & ? & 0 \\ -1 & 3 & 2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & 0 & 0 \\ 0 & ? & -1 & -1 \\ 1 & -1 & ? & 0 \\ 0 & -1 & 1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & 0 & 0 \\ -3 & ? & 0 & 1 \\ -3 & 1 & ? & 1 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & -1 & 2 \\ -2 & ? & 2 & -2 \\ 0 & 0 & ? & 1 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & 0 & -1 \\ -1 & ? & -1 & 1 \\ -1 & 0 & ? & 2 \\ -1 & 0 & -1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & 1 \\ -1 & ? & -2 & -4 \\ -1 & 1 & ? & 0 \\ 1 & -3 & 3 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 2 -2 -1 -2), (2 2 2 -1 1), (2 1 -1 -1 -2), (-3 -3 -4 1 -3), (-1 -1 -2 0 -2),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (2 2 -5 8) is a linear combination of the vectors

(1 0 0 2), (1 0 2 2), (-2 2 1 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\left(X + \begin{pmatrix} 1 & 0 & 1 \\ -2 & 1 & 1 \\ 1 & -1 & -1 \end{pmatrix}\right) \cdot \begin{pmatrix} -1 & -2 & 1 \\ 1 & 1 & 0 \\ 0 & -1 & 2 \end{pmatrix} = \begin{pmatrix} -2 & -3 & 1 \\ 4 & 5 & 0 \\ -2 & 0 & -4 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & 1 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & a & -2 & 2 \\ 0 & 1 & -1 & -1 \\ 1 & -2 & 1 & 1 \\ -2 & -1 & 0 & 1 \end{pmatrix}$ has determinant -14?

1) -1 2) 0 3) 1 4) 3 5) -3

Exercise 6

Find the solution of the linear system

$$7x_1 + x_3 + x_4 == -6$$
$$x_1 + 7x_2 + 3x_3 + 9x_4 == 4$$
$$-x_1 + 2x_2 + x_3 + 3x_4 == 0$$
$$-4x_1 - 8x_2 - 4x_3 - 11x_4 == -1$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ -3 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -13 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ -2 \\ ? \\ ? \end{pmatrix}$

3) $\begin{pmatrix} ? \\ 4 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 8 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -2 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -4 \end{pmatrix}, \begin{pmatrix} 2 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ 2 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -12 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	4K	0K	3K
Feed of company 2	10K	2K	5K
Feed of company 3	4K	1K	2K
Feed of company 4	7K	1K	4K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
44K	8K	24K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 4 to be equal to 4.

1) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

4) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 77388334

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & -1 \\ 1 & -1 & 1 & 2 \\ 0 & 0 & -1 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -5 & 0 & -4 \\ 0 & ? & 1 & 0 \\ -1 & 3 & ? & 1 \\ 2 & -2 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -5 & 1 & 0 \\ -1 & ? & -1 & -1 \\ -3 & 6 & ? & -1 \\ -1 & 1 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & 1 & 2 \\ 1 & ? & 0 & 1 \\ 0 & 1 & ? & -1 \\ 0 & -1 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & -2 & 1 \\ -1 & ? & 1 & 0 \\ -2 & 2 & ? & -1 \\ -1 & 1 & 1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -1 & 0 \\ 1 & ? & -2 & 1 \\ -1 & 2 & ? & -1 \\ -1 & 1 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 0 & -1 \\ 1 & ? & -2 & 0 \\ 0 & 1 & ? & -1 \\ -2 & -1 & 1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 1 & 0 \\ 0 & ? & -1 & 1 \\ 0 & 0 & ? & 1 \\ 1 & 3 & -2 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(1 2 -1 -2 0), (0 1 1 1 -1), (2 -2 0 0 -2)
, (1 1 -2 -1 -1), (-2 3 1 1 1), (1 2 0 2 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5 6) 6

Exercise 3

Check whether the vector (n-tuple) (4 1 4 9) is a linear combination of the vectors

(2 1 -2 -2), (4 2 -4 -4), (2 2 -2 0), (0 1 0 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X + \begin{pmatrix} 0 & -1 & -2 \\ 1 & 0 & 0 \\ 1 & 0 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 0 & 0 & 1 \\ -1 & 0 & 1 \\ 0 & -1 & 1 \end{pmatrix} = \begin{pmatrix} 2 & 1 & -2 \\ 0 & 0 & 1 \\ -1 & -1 & 4 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix
$\begin{pmatrix} 1 & a & -2 & 1 \\ 0 & 1 & -2 & 3 \\ 1 & 1 & 1 & 0 \\ 1 & 0 & 2 & -2 \end{pmatrix}$ has determinant -4?

1) -1 2) -4 3) 1 4) -5 5) 2

Exercise 6

Find the solution of the linear system

$$2x_1 + x_2 - x_3 - 3x_4 == -5$$
$$x_2 - x_3 + 7x_4 == 3$$
$$2x_1 + 2x_2 - 3x_3 - x_4 == 0$$
$$-x_1 - x_2 + 2x_3 + 3x_4 == -1$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ -1 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -3 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \end{pmatrix} + \left\langle \begin{pmatrix} 5 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ -1 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -11 \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ -1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -10 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -8 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ -3 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -5 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 9 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	12K	2K	7K
Feed of company 2	49K	8K	29K
Feed of company 3	32K	5K	19K
Feed of company 4	24K	4K	14K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
257K	41K	152K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=?, Feed 2=?, Feed 3=3, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

3) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 77434209

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 3 & 2 & 1 \\ 0 & 2 & 1 & 0 \\ 3 & 4 & 6 & 6 \\ 2 & 3 & 4 & 4 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -7 & 9 & -3 \\ 1 & ? & 5 & -2 \\ -2 & -1 & ? & 0 \\ 0 & 2 & -2 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & -6 & -1 \\ 0 & ? & 2 & 0 \\ 0 & 0 & ? & -1 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & -1 & 7 \\ 0 & ? & 0 & 1 \\ 0 & -1 & ? & 2 \\ 0 & -1 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 1 & -2 \\ 0 & ? & -2 & 3 \\ 0 & 1 & ? & -6 \\ -1 & 0 & -3 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & 0 & 2 \\ 2 & ? & 0 & -1 \\ -2 & -1 & ? & 2 \\ 1 & 1 & 2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -2 & 1 & 3 \\ -1 & ? & 0 & 1 \\ 3 & 2 & ? & -2 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & -1 & -2 \\ -2 & ? & -1 & 2 \\ -2 & 1 & ? & 4 \\ -1 & -1 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 2 1 2), (0 1 -1 0), (-1 -2 -2 -1),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (-5 2 6) is a linear combination of the vectors

(1 -2 2), (2 -2 0), (1 0 -2), (-1 0 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} -1 & 0 \\ -1 & -1 \end{pmatrix}.X.\begin{pmatrix} 7 & 4 \\ 5 & 3 \end{pmatrix}=\begin{pmatrix} 0 & 0 \\ 2 & 1 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 0 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & -1 & 0 & 2 \\ 0 & 1 & -1 & a \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{pmatrix}$ has determinant 4?

1) 0 2) 2 3) 1 4) -1 5) 5

Exercise 6

Find the solution of the linear system

$$-2x_1 - 4x_2 + 7x_3 + 4x_4 == -3$$
$$-7x_1 - 3x_2 + 2x_3 + x_4 == -8$$
$$5x_1 - x_2 + 5x_3 + 3x_4 == 5$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ -4 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -6 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 8 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 0 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 1 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -48 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 11 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ 47 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -44 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -11 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ 8 \end{pmatrix}$

5) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 26 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -13 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	2K	1K	2K
Feed of company 2	9K	5K	9K
Feed of company 3	9K	5K	10K
Feed of company 4	10K	5K	5K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
85K	45K	75K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 13.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

2) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=4, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=3

5) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 77435467

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 1 & 0 & 1 \\ -1 & 0 & 0 & -1 \\ 1 & 0 & 2 & 0 \\ 1 & 1 & -1 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & -1 & -2 \\ 1 & ? & 0 & 0 \\ -1 & 1 & ? & 1 \\ -2 & 1 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & -1 & -2 \\ 3 & ? & -2 & -4 \\ -2 & 1 & ? & 0 \\ -3 & 2 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 0 & -3 \\ -1 & ? & 0 & 3 \\ 0 & -1 & ? & 0 \\ 1 & 0 & 0 & ? \end{pmatrix}$ 4) $\begin{pmatrix} ? & -1 & 3 & 3 \\ 2 & ? & 1 & 2 \\ -1 & 0 & ? & -1 \\ 5 & 1 & 4 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & -2 & -1 \\ 1 & ? & 1 & 1 \\ 2 & -1 & ? & 1 \\ 2 & -1 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & -1 & -1 \\ -1 & ? & 0 & 1 \\ 1 & 2 & ? & -1 \\ 0 & -2 & -1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -1 & 0 \\ 0 & ? & 2 & 0 \\ 0 & 1 & ? & 0 \\ -1 & 1 & 3 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-1 0 1 -2 -1), (-3 0 2 -2 -2), (0 -2 2 0 1), (-1 -1 0 -1 -1), (2 0 -1 0 1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-7 2 -6 3) is a linear combination of the vectors

(1 0 1 -1), (1 -1 0 2), (2 -1 2 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\left(X + \begin{pmatrix} 1 & 0 & 0 \\ -1 & 1 & 0 \\ -1 & 2 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & -1 & 1 \\ 1 & 2 & -1 \\ -1 & -3 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 3 & -2 \\ 0 & 0 & 0 \\ 1 & 8 & -5 \end{pmatrix}$$

1) $\begin{pmatrix} * & -2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & 0 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * \\ -2 & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ -1 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ -2 & 0 & 1 & 0 \\ a & -2 & 1 & 2 \end{pmatrix}$ has determinant 1?

1) 0 2) 5 3) -2 4) -3 5) 1

Exercise 6

Find the solution of the linear system

$$-x_1 - x_2 == 7$$
$$-2\,x_1 + 3\,x_2 - x_3 == -4$$
$$x_1 - 2\,x_2 + x_3 == 3$$
$$x_1 - x_2 + x_3 == -1$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ 1 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -5 \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ -5 \\ ? \end{pmatrix}$

3) $\begin{pmatrix} ? \\ -4 \\ ? \end{pmatrix}$

4) $\begin{pmatrix} ? \\ 9 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 1 \end{pmatrix}, \begin{pmatrix} ? \\ 5 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} -1 \\ ? \\ ? \end{pmatrix}$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	4K	11K	8K	8K
vegetable flours	4K	15K	10K	13K
fish flours	1K	5K	3K	5K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
75K	105K	36K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 8.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

2) Feed 1=?, Feed 2=2, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

4) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 77647383

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 2 & -1 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 3 & -1 & 2 & -1 \\ -2 & 0 & -1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 0 & -1 & -1 \\ 0 & ? & 0 & 0 \\ -1 & 1 & ? & 2 \\ 1 & 1 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -4 & -4 & 3 \\ -1 & ? & 2 & -1 \\ 1 & -3 & ? & 2 \\ 0 & -1 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -4 & -1 & -2 \\ -1 & ? & -1 & 1 \\ 0 & 4 & ? & 2 \\ 1 & -1 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & -7 & 4 \\ 1 & ? & 5 & -2 \\ 1 & 2 & ? & -3 \\ 0 & 1 & 2 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & -1 \\ 1 & ? & 1 & 1 \\ 1 & 1 & ? & 1 \\ 1 & -1 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 0 & 2 \\ 1 & ? & -1 & -2 \\ 0 & 2 & ? & 0 \\ 0 & 1 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 1 & 0 \\ -5 & ? & 3 & 2 \\ 1 & -1 & ? & 0 \\ -3 & 1 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 1 1 -1 -1), (2 1 -1 2 2), (0 -2 -1 2 0), (-1 0 2 -1 1),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (2 -3 -9 5) is a linear combination of the vectors

(-1 -2 -1 0), (-2 -4 -2 0), (-2 -2 -1 -1), (1 1 -2 1), (1 0 0 1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & -1 & 1 \\ 1 & 0 & 1 \\ 0 & 0 & 1 \end{pmatrix} \cdot \left(X - \begin{pmatrix} 2 & -1 & 0 \\ 2 & -2 & 1 \\ 1 & -1 & 0 \end{pmatrix} \right) = \begin{pmatrix} -3 & 1 & 4 \\ -4 & 2 & 2 \\ -2 & 1 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & -1 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ -2 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -2 & 0 & 1 & 1 \\ -2 & -1 & 1 & a \\ 0 & 1 & 0 & 0 \\ -1 & 1 & 0 & 2 \end{pmatrix}$ has determinant 2?

1) 3 2) -4 3) 5 4) 1 5) 0

Exercise 6

Find the solution of the linear system

$$-x_1 + x_3 + 4\,x_4 == 4$$
$$3\,x_1 - 2\,x_2 - x_3 + 2\,x_4 == 0$$
$$-x_1 + 2\,x_2 - 2\,x_4 == 1$$
$$2\,x_1 + x_2 - x_3 + x_4 == 4$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ 2 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -2 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ -2 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -2 \end{pmatrix}, \begin{pmatrix} ? \\ -3 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -7 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -10 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -10 \end{pmatrix} + \left\langle \begin{pmatrix} -4 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -10 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -9 \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \end{pmatrix} + \left\langle \begin{pmatrix} -4 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ 4 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -1 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	3K	1K	5K	2K
vegetable flours	2K	1K	0K	2K
fish flours	6K	2K	6K	5K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
45K	15K	72K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 13.

1) Feed 1=?, Feed 2=?, Feed 3=3, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=4, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=5, Feed 4=?

4) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 77648906

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 1 & 0 & 1 \\ 1 & 3 & 0 & 2 \\ 0 & -3 & 1 & -1 \\ 2 & 3 & 0 & 3 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 0 & 0 & -1 \\ 1 & ? & 0 & -1 \\ 0 & 2 & ? & -1 \\ -3 & -1 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & 1 & 1 \\ -1 & ? & 1 & 0 \\ -1 & -3 & ? & 2 \\ 1 & 2 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & 3 & -1 \\ 0 & ? & -5 & 4 \\ 0 & -6 & ? & -3 \\ 0 & 1 & -1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 0 & 0 \\ 0 & ? & 1 & -1 \\ 0 & 1 & ? & -1 \\ 1 & -3 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & -1 \\ 1 & ? & 0 & 3 \\ -1 & -1 & ? & -1 \\ 0 & 0 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 0 & 1 \\ 1 & ? & 1 & 0 \\ -1 & 0 & ? & -1 \\ 3 & -1 & -2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 1 & 0 \\ 1 & ? & 0 & 0 \\ -5 & 1 & ? & -1 \\ -3 & 1 & 3 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 -2 -1 1 0), (-1 0 -2 2 2), (1 2 -1 1 2), (1 -1 0 0 1),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (-3 -3 -7 -9) is a linear combination of the vectors

(0 4 -2 0), (0 2 -1 0),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 0 & 1 & -1 \\ 2 & 0 & 1 \\ -1 & -1 & 0 \end{pmatrix} \cdot \left(X - \begin{pmatrix} -2 & 2 & 5 \\ -1 & 1 & 2 \\ -1 & 0 & 2 \end{pmatrix} \right) = \begin{pmatrix} 0 & -1 & 0 \\ 7 & -1 & -9 \\ -4 & 1 & 5 \end{pmatrix}$$

1) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & * \\ 1 & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * \\ 2 & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ * & * & -1 \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -2 & 1 & 0 & -2 \\ -1 & -1 & 0 & 3 \\ a & 0 & 2 & 1 \\ -1 & 2 & 1 & -3 \end{pmatrix}$ has determinant 13?

1) 0 2) 3 3) 4 4) -1 5) -4

Exercise 6

Find the solution of the linear system

$$-5\,x_1 + 2\,x_2 + 2\,x_3 + 2\,x_4 + 5\,x_5 == -1$$
$$-12\,x_1 + 5\,x_2 + 4\,x_3 - 4\,x_4 - 4\,x_5 == -3$$
$$x_1 - x_2 + x_3 + 15\,x_4 + 15\,x_5 == -4$$
$$4\,x_1 - 2\,x_2 - x_3 + 5\,x_4 - 4\,x_5 == -4$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ 8 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -14 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -34 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} 11 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -32 \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} 14 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -1 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -29 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -7 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -9 \end{pmatrix}, \begin{pmatrix} 7 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 9 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ 4 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -5 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix}, \begin{pmatrix} 9 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -10 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	4K	10K	5K
Feed of company 2	3K	5K	3K
Feed of company 3	1K	3K	1K
Feed of company 4	4K	11K	5K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
27K	74K	33K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

3) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=3

5) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 77770524

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 3 & 0 & 0 \\ -3 & -2 & 2 & 1 \\ -4 & -3 & 3 & 1 \\ 2 & 3 & -1 & 0 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & 2 & 4 \\ 6 & ? & -7 & -15 \\ 0 & 0 & ? & 1 \\ -2 & -3 & 3 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & -2 & 0 \\ 0 & ? & 1 & -1 \\ 2 & 2 & ? & -5 \\ -1 & -1 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & 3 & 3 \\ 1 & ? & -1 & -1 \\ -1 & -3 & ? & 2 \\ -2 & 0 & 1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & -1 & -1 \\ -1 & ? & -2 & -2 \\ 2 & 2 & ? & 3 \\ 2 & 2 & 1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & -1 & 1 \\ 1 & ? & -1 & 1 \\ 0 & -1 & ? & -1 \\ -2 & 1 & 2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 0 & 0 \\ 1 & ? & 2 & 1 \\ -4 & 1 & ? & 0 \\ -3 & -1 & -3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 2 & 0 \\ -1 & ? & -1 & 1 \\ 0 & -1 & ? & 1 \\ 0 & -1 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 0 2 2 0), (0 -2 -2 -1 -2), (-2 1 -2 1 1), (-2 1 -2 2 -1),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (8 -8 0 -1) is a linear combination of the vectors

(-4 4 -2 -4), (-2 2 -1 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X - \begin{pmatrix} 2 & 3 & 3 \\ 1 & 2 & 2 \\ 3 & 6 & 7 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & -1 & 2 \\ -2 & 3 & -2 \\ -1 & 1 & -1 \end{pmatrix}^{-1} = \begin{pmatrix} -1 & -4 & 8 \\ 1 & -3 & 9 \\ -5 & -9 & 16 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & -1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * \\ 1 & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ -1 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & 1 & 0 & 1 \\ 0 & -1 & 1 & 1 \\ 1 & 1 & -2 & -2 \\ 2 & 1 & -1 & a \end{pmatrix}$ has determinant 3?

1) 1 2) 0 3) 4 4) -5 5) 3

Exercise 6

Find the solution of the linear system

$$x_1 + 7\,x_3 - 5\,x_4 - 14\,x_5 == -5$$
$$-x_2 - 4\,x_3 + 3\,x_4 + 8\,x_5 == 0$$
$$5\,x_1 + 2\,x_2 + 4\,x_3 - 2\,x_4 - 7\,x_5 == 0$$
$$6\,x_1 + 3\,x_3 - x_4 - 5\,x_5 == -5$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ 28 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -3 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -10 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ 3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -4 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -10 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -20 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -5 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 7 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -6 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 7 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -9 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 2 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ -8 \\ ? \\ ? \end{pmatrix}$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	5K	14K	22K
Feed of company 2	1K	3K	5K
Feed of company 3	11K	30K	47K
Feed of company 4	11K	31K	50K

The experts of the livestock farm determined
that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
88K	243K	383K

How many sacks of every company are necessary to reach the
recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

2) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

5) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 78026316

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & -2 & -1 & 1 \\ -1 & 2 & 2 & -2 \\ 0 & 0 & 0 & 1 \\ 1 & -1 & -1 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 1 & -2 & 2 \\ -1 & ? & -1 & 1 \\ 1 & 1 & ? & 0 \\ 0 & 0 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & -3 & 1 \\ 0 & ? & 0 & 1 \\ 0 & -1 & ? & 0 \\ 0 & -1 & -2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & 3 & -2 \\ -2 & ? & -1 & 1 \\ 3 & -1 & ? & -1 \\ -8 & 3 & -4 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & -2 & 1 \\ -4 & ? & 4 & -2 \\ 0 & 0 & ? & 0 \\ 1 & 0 & -1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & -1 \\ -1 & ? & 0 & 0 \\ 1 & -2 & ? & -2 \\ 0 & 0 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 2 & 0 \\ -1 & ? & 2 & 0 \\ -1 & 1 & ? & -1 \\ 1 & -1 & -2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 3 & -1 \\ -2 & ? & 3 & -1 \\ -1 & -2 & ? & -1 \\ 0 & -1 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-3 -1 2 -1), (1 0 -1 1), (1 -1 -2 -2), (-2 -1 1 0),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (6 -3 -1) is a linear combination of the vectors

(1 1 0), (-2 2 2), (-1 1 -1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}.X.\begin{pmatrix} 2 & -3 \\ -3 & 5 \end{pmatrix}=\begin{pmatrix} 5 & -8 \\ 2 & -3 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 1 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & -2 & 0 & -1 \\ 1 & -1 & 1 & 0 \\ 1 & a & 1 & -2 \\ 0 & 2 & 1 & -2 \end{pmatrix}$ has determinant 9?

1) 4 2) -1 3) -5 4) -3 5) -2

Exercise 6

Find the solution of the linear system

$$2x_1 - 3x_2 + 4x_3 + 5x_4 == -3$$
$$x_2 + 8x_3 + 7x_4 == -1$$
$$-3x_1 + 5x_2 - 2x_3 - 4x_4 == 4$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ 6 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -4 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 9 \end{pmatrix}, \begin{pmatrix} ? \\ -1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 9 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \end{pmatrix} + \left\langle \begin{pmatrix} -12 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -4 \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ 0 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -14 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -7 \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ -6 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 9 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -5 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 5 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ 1 \end{pmatrix} + \left\langle \begin{pmatrix} -11 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -5 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	5K	12K	4K	7K
vegetable flours	2K	5K	2K	3K
fish flours	9K	20K	7K	12K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
53K	23K	90K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 2 to be equal to 2.

1) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

5) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 78428692

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 0 & -1 & 0 & -1 \\ -1 & -5 & 2 & -2 \\ -2 & -8 & 3 & -3 \\ 2 & 3 & 0 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -4 & -1 & -3 \\ 0 & ? & 1 & 1 \\ -1 & 2 & ? & 1 \\ -2 & 3 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & 2 & 1 \\ -2 & ? & -4 & -1 \\ -3 & 8 & ? & -1 \\ 1 & -6 & 4 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & 1 & 2 \\ 0 & ? & 2 & 2 \\ 0 & -1 & ? & 1 \\ 0 & -4 & 4 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & -2 & 0 \\ -1 & ? & 2 & 1 \\ -1 & -1 & ? & 0 \\ 0 & 0 & -1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & 0 & 1 \\ 0 & ? & -1 & 0 \\ 0 & 0 & ? & -1 \\ 0 & 0 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & 0 & 1 \\ 0 & ? & 1 & 2 \\ 0 & -1 & ? & 2 \\ 0 & 1 & -3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 2 & -1 \\ -1 & ? & -1 & 1 \\ 0 & 0 & ? & 0 \\ -2 & -1 & -2 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-1 1 1 0), (-2 2 1 0), (-1 2 -2 -1), (-1 1 0 0),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (5 -9 -7) is a linear combination of the vectors

(1 0 0), (2 -1 2), (-3 -1 -1), (-4 0 -3), (-2 -1 -1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 2 & 1 \\ -5 & -2 \end{pmatrix}.X.\begin{pmatrix} 3 & -2 \\ 2 & -1 \end{pmatrix}^{-1} = \begin{pmatrix} 5 & -7 \\ -12 & 17 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 1 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * \\ -1 & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & -1 & 1 & 1 \\ 2 & 3 & 0 & -1 \\ 0 & 1 & 0 & 0 \\ a & 1 & -1 & 1 \end{pmatrix}$ has determinant 7?

1) 0 2) -1 3) 3 4) -5 5) 4

Exercise 6

Find the solution of the linear system

$$-x_1 + 5\,x_2 + 2\,x_3 + x_4 == -1$$
$$7\,x_2 + 7\,x_3 + 3\,x_4 == -1$$
$$-x_1 - 2\,x_2 - 5\,x_3 - 2\,x_4 == 0$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -3 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -21 \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} -2 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -2 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -23 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ -8 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 1 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ -1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 4 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 6 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ 10 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 5 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -8 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -3 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -6 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	11K	7K	9K
Feed of company 2	21K	14K	19K
Feed of company 3	18K	11K	13K
Feed of company 4	33K	22K	30K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
277K	179K	233K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 15.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

2) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

3) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=4, Feed 4=?

5) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 753486173

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 0 & 0 & 1 \\ 2 & 1 & 1 & 1 \\ 0 & 0 & 1 & 2 \\ 2 & 1 & 1 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -1 & -3 & 0 \\ 1 & ? & 1 & 0 \\ -3 & -2 & ? & 2 \\ -2 & -1 & -3 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 1 & 0 & -1 \\ -2 & ? & -1 & 3 \\ 0 & 2 & ? & -2 \\ 0 & -1 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 4 & 1 \\ 0 & ? & -2 & 0 \\ 1 & -1 & ? & 0 \\ -1 & 0 & -3 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & -1 & 0 \\ 0 & ? & 0 & -1 \\ -1 & -1 & ? & 0 \\ -1 & 2 & 1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & 0 & -1 \\ -5 & ? & -1 & 1 \\ 9 & -4 & ? & -2 \\ -5 & 4 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & 0 & -1 \\ 0 & ? & -1 & 0 \\ 0 & 0 & ? & 0 \\ 1 & 0 & -1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & 0 \\ 2 & ? & 0 & 1 \\ -2 & 0 & ? & 0 \\ 0 & -1 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 -1 -2 -1 2), (-1 -1 2 1 1), (0 -1 1 -2 -1), (0 -1 -2 -1 2),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (0 6 5 2) is a linear combination of the vectors

(-1 -2 -1 2), (-1 0 -1 1), (-3 -3 -2 1), (2 1 1 0), (-2 -1 -1 -1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 1 & -1 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{pmatrix} . X . \begin{pmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} -1 & 2 & -1 \\ 3 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & -1 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & 2 & -1 & 1 \\ 0 & 1 & -1 & 1 \\ 0 & 1 & a & 1 \\ 1 & 2 & -2 & 1 \end{pmatrix}$ has determinant -2?

1) -3 2) -1 3) -2 4) 3 5) -4

Exercise 6

Find the solution of the linear system

$$2x_1 + 3x_2 + 2x_3 + x_4 == -2$$
$$-3x_1 - 4x_2 - 3x_3 + 5x_4 == 4$$
$$-3x_1 - 7x_3 + 5x_4 == -8$$
$$2x_1 + 2x_2 + 3x_3 + x_4 == 1$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ 5 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 32 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ -7 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 7 \\ ? \end{pmatrix}, \begin{pmatrix} 4 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} -2 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -5 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -4 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 2 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -7 \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ 4 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -10 \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -10 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	9K	10K	22K	57K
vegetable flours	4K	4K	9K	23K
fish flours	0K	1K	2K	6K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
272K	111K	25K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

2) Feed 1=?, Feed 2=2, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=4, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=5, Feed 4=?

5) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 10618500094

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & -1 & 1 & -1 \\ -2 & -1 & -1 & -1 \\ -5 & 0 & -3 & 2 \\ 8 & 0 & 5 & -3 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -1 & -6 & -4 \\ -2 & ? & 4 & 3 \\ -1 & 1 & ? & 6 \\ 1 & -1 & -1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & 1 & 0 \\ -1 & ? & 1 & -1 \\ 1 & -1 & ? & 1 \\ 1 & 0 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & -2 & 0 \\ 0 & ? & 4 & 1 \\ -2 & 2 & ? & 0 \\ 0 & 0 & 3 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & -1 & 1 \\ 0 & ? & 0 & 0 \\ 0 & 0 & ? & 0 \\ 1 & -2 & -1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & 1 \\ 0 & ? & 0 & -1 \\ 0 & 1 & ? & -1 \\ 3 & -1 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & -12 & -5 \\ -2 & ? & -5 & -4 \\ 3 & 0 & ? & 3 \\ -1 & -1 & -3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & 0 \\ -3 & ? & 2 & -1 \\ 2 & 1 & ? & 0 \\ 9 & 2 & -5 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 1 0 -2), (-2 0 1 -1), (-1 0 -1 0),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (-2 -2 -2) is a linear combination of the vectors

(-2 -2 -2), (-4 -4 -4),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 0 & 1 \\ -1 & 1 \end{pmatrix}^{-1}.X + \begin{pmatrix} -1 & 1 \\ -4 & 3 \end{pmatrix} = \begin{pmatrix} 0 & 2 \\ -3 & 3 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 1 & 0 & 0 & 1 \\ 1 & 1 & 1 & -3 \\ -2 & 0 & -1 & 1 \\ a & 0 & 1 & 1 \end{pmatrix}$ has determinant -2?

1) -2 2) 5 3) -5 4) 2 5) -4

Exercise 6

Find the solution of the linear system

$$-x_1 + x_2 + x_3 + 5\,x_4 + x_5 == 0$$
$$-4\,x_1 + 3\,x_2 - 5\,x_3 + 2\,x_4 - 5\,x_5 == 3$$
$$5\,x_1 - 4\,x_2 + 4\,x_3 - 7\,x_4 + 4\,x_5 == -3$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ -6 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 5 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ -3 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -8 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -13 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -9 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -1 \end{pmatrix} + \left\langle \begin{pmatrix} -7 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -21 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -5 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ 3 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -12 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -16 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -5 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 5 \end{pmatrix} + \left\langle \begin{pmatrix} -4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 3 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	2K	2K	5K	6K
vegetable flours	5K	6K	14K	17K
fish flours	5K	5K	11K	13K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
32K	88K	72K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 1 to be equal to 4.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=4

3) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 10901600079

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 0 & -1 & -1 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & -2 & -2 & -1 \\ 0 & 2 & 3 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -11 & -5 & -1 \\ -1 & ? & 1 & 0 \\ 1 & -2 & ? & 0 \\ 1 & -5 & -2 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 1 & 0 & 0 \\ -1 & ? & -1 & -1 \\ 0 & 0 & ? & 1 \\ 2 & 0 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & 7 & -2 \\ 3 & ? & 0 & 0 \\ 0 & 0 & ? & 0 \\ 2 & 3 & -3 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & -4 & 3 \\ -2 & ? & 0 & -1 \\ 1 & -1 & ? & 1 \\ -1 & 0 & 1 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & -1 & 1 \\ 0 & ? & 0 & -1 \\ -1 & 0 & ? & 0 \\ -1 & 0 & 2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -2 & 3 & 0 \\ 0 & ? & -2 & 0 \\ 0 & 0 & ? & 0 \\ 1 & 2 & -3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -2 & 3 & 4 \\ 9 & ? & 4 & 5 \\ -5 & 2 & ? & -3 \\ 7 & -1 & 3 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(1 1 0 0 -2), (-1 1 -2 0 1), (-1 1 1 2 0), (2 -1 1 -2 1), (2 -2 0 -1 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (0 0 -4 -5) is a linear combination of the vectors

(-1 -3 1 3), (0 1 -1 -1), (-1 -1 -1 1), (-2 -4 0 4), (0 2 -2 -2), (-1 -2 0 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X + \begin{pmatrix} 1 & 0 & 0 \\ -2 & 3 & 1 \\ -2 & 2 & 1 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & 0 & 0 \\ 0 & 2 & 1 \\ 0 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 0 & -3 & -2 \\ -3 & 6 & 4 \\ -2 & 7 & 4 \end{pmatrix}$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & -2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 0 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & -1 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & 0 & -1 & 0 \\ 0 & 0 & 0 & 1 \\ 1 & 1 & 1 & 1 \\ a & 1 & -2 & 1 \end{pmatrix}$ has determinant 4?

1) 0 2) 3 3) 2 4) 5 5) 4

Exercise 6

Find the solution of the linear system

$$3x_1 - 8x_2 + 4x_3 - 5x_4 == -1$$
$$-2x_1 + 6x_2 - 3x_3 - 5x_4 == -2$$
$$-x_1 + 5x_2 - 2x_3 == 3$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ 1 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -14 \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ -8 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 5 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -7 \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ 1 \end{pmatrix}$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -15 \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} -9 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -52 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	3K	16K	6K
Feed of company 2	2K	11K	4K
Feed of company 3	2K	10K	4K
Feed of company 4	2K	13K	5K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
26K	142K	53K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 11.

1) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

2) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=4, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 11116551121

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & -1 & -1 & -1 \\ 2 & 5 & 4 & 1 \\ 2 & 6 & 5 & 2 \\ 0 & 0 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & 0 & -3 \\ 0 & ? & 0 & 2 \\ 1 & -2 & ? & -2 \\ 0 & -1 & -1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & 0 & -9 \\ -10 & ? & -1 & 14 \\ 0 & 0 & ? & 1 \\ 1 & 0 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 1 & 1 \\ 3 & ? & -4 & -5 \\ -2 & -2 & ? & 4 \\ 1 & 1 & -1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & 1 & 0 \\ -2 & ? & -6 & 3 \\ 2 & -8 & ? & -4 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & -2 & 2 \\ 1 & ? & -3 & 2 \\ 2 & 1 & ? & 4 \\ 0 & 1 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & -1 & 0 \\ 2 & ? & 1 & 2 \\ -1 & -1 & ? & -3 \\ 1 & 0 & 1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & -1 \\ 1 & ? & 0 & -1 \\ 0 & 1 & ? & -2 \\ 0 & 1 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-1 -4 -4 -1 -2), (0 0 2 2 -2), (-1 -2 -2 0 -2), (0 2 2 1 0), (0 -1 -1 0 -2),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (8 -4 2 -7) is a linear combination of the vectors

(0 -2 4 1), (2 0 -2 -2), (2 -2 2 -1), (0 0 2 -1), (-2 0 4 1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 1 & 1 & -1 \\ 0 & 1 & -1 \\ -1 & 1 & 0 \end{pmatrix}.X - \begin{pmatrix} 1 & 0 & 1 \\ 2 & 1 & 3 \\ 1 & 1 & 3 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 1 \\ -2 & 0 & -2 \\ -3 & 0 & -3 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} 0 & 0 & 1 & 5 \\ 0 & 0 & 1 & 4 \\ 1 & a & 0 & 1 \\ 1 & 1 & 0 & 2 \end{pmatrix}$ has determinant -6?

1) 1 2) -5 3) -4 4) 2 5) 5

Exercise 6

Find the solution of the linear system

$$4\,x_1 - 7\,x_2 - 2\,x_3 + 3\,x_4 + 2\,x_5 + 4\,x_6 == 1$$
$$6\,x_1 - 11\,x_2 - 3\,x_3 + 2\,x_4 - 4\,x_5 - 5\,x_6 == -5$$
$$5\,x_1 - 10\,x_2 - 3\,x_3 - 5\,x_4 + 5\,x_6 == 2$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ 5 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -5 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 7 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ -1 \\ ? \\ ? \\ ? \end{pmatrix}$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ ? \\ 3 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -6 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -12 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -14 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} 5 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -6 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 28 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 54 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ -34 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -5 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -10 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 55 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	5K	11K	10K
Feed of company 2	7K	15K	13K
Feed of company 3	19K	42K	38K
Feed of company 4	7K	17K	17K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
85K	195K	184K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

3) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

4) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 20531650581

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 0 & 1 & 0 \\ -2 & 1 & -1 & -1 \\ -4 & 0 & -1 & -1 \\ 2 & 0 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -1 & -3 & -1 \\ 1 & ? & 0 & 0 \\ 2 & 0 & ? & 1 \\ 2 & 0 & 2 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & -1 & 1 \\ 0 & ? & 1 & -1 \\ -1 & 0 & ? & -1 \\ 4 & -1 & -3 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 0 & 0 \\ 2 & ? & -1 & 1 \\ 3 & 0 & ? & -2 \\ -1 & 0 & -2 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & -1 & -1 \\ 2 & ? & 1 & 2 \\ 2 & 0 & ? & 1 \\ 2 & 0 & 2 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & -1 \\ 6 & ? & -1 & 1 \\ 6 & 1 & ? & 2 \\ 2 & 0 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 5 & 4 \\ 0 & ? & 3 & 3 \\ 0 & -1 & ? & 1 \\ 0 & -2 & 4 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & -1 \\ -1 & ? & 0 & 0 \\ -4 & -1 & ? & -1 \\ 2 & 3 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 -2 1 2 -1), (-4 4 2 0 2), (-2 2 1 0 1), (2 1 2 0 0), (1 -1 -2 1 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-9 -4 0 2) is a linear combination of the vectors

(2 0 0 -2), (2 1 0 1), (-1 1 -1 -2), (0 -2 1 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 2 & -1 & 2 \\ -1 & 1 & -1 \\ -1 & 0 & 0 \end{pmatrix} \cdot \left(X + \begin{pmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix} \right) = \begin{pmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ -1 & 0 & 1 \end{pmatrix}$$

1) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & -1 \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & 2 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -2 & 1 & a & -2 \\ -1 & -2 & -1 & 3 \\ 0 & 1 & -1 & -1 \\ 0 & 1 & 2 & 0 \end{pmatrix}$ has determinant -12?

1) 5 2) 2 3) -4 4) -5 5) 1

Exercise 6

Find the solution of the linear system

$$-4x_1 + 3x_2 - x_3 - x_4 - 2x_5 == 0$$
$$2x_1 - 5x_2 + 8x_3 + x_4 + 4x_5 == 5$$
$$-2x_1 - 3x_2 + 9x_3 - x_4 + x_5 == 6$$
$$-x_2 + 2x_3 - x_4 - x_5 == 1$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ -7 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 10 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} -3 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 12 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -8 \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 4 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -9 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix}, \begin{pmatrix} -7 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -8 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ 0 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 56 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -7 \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -8 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -34 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -35 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	2K	4K	1K	3K
vegetable flours	0K	3K	1K	2K
fish flours	8K	9K	2K	8K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
27K	14K	78K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 11.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

2) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=3

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 20705551589

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} -2 & -3 & 0 & -3 \\ 0 & -1 & 0 & -2 \\ 1 & 0 & 1 & 0 \\ 1 & 1 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -1 & -2 & 0 \\ -1 & ? & 1 & 0 \\ -2 & 0 & ? & 1 \\ -1 & 1 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & -1 & 0 \\ -1 & ? & 1 & 0 \\ -1 & 1 & ? & 0 \\ 0 & -2 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 0 & -1 \\ -1 & ? & 0 & -1 \\ -2 & 1 & ? & 0 \\ 0 & 3 & 1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & 0 & 3 \\ -2 & ? & 0 & -4 \\ -1 & 0 & ? & -3 \\ 1 & -1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 2 & 0 \\ 1 & ? & 0 & 1 \\ 0 & -2 & ? & -1 \\ -1 & 0 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & -1 & -1 \\ 1 & ? & -2 & -1 \\ -1 & 1 & ? & 1 \\ 1 & 0 & -2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -1 & 1 \\ 0 & ? & 1 & 0 \\ 0 & 2 & ? & 1 \\ 0 & 3 & -2 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(2 1 -2 1 -2), (2 -1 2 -1 0), (-1 2 -1 0 0), (0 2 1 2 0),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (-8 5 -1 6) is a linear combination of the vectors

(-1 1 0 -2), (-2 -1 -2 1), (1 -2 2 -2)
, (0 -1 -2 -2), (-3 0 -2 -1), (-3 1 -4 3),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & -3 & -1 \\ -1 & 0 & -1 \\ 1 & 2 & 2 \end{pmatrix}.X - \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{pmatrix} = \begin{pmatrix} -2 & -3 & 2 \\ -1 & -3 & -2 \\ 1 & 4 & -1 \end{pmatrix}$$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & -2 \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & -1 \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ 1 & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & 2 & 0 & 1 \\ -1 & -1 & 0 & 0 \\ a & 1 & -1 & 1 \\ -1 & 1 & -1 & 0 \end{pmatrix}$ has determinant 9?

1) -5 2) 5 3) -1 4) -3 5) 1

Exercise 6

Find the solution of the linear system

$$-x_1 + 6\,x_2 + 5\,x_3 - 3\,x_4 == -4$$
$$2\,x_2 + 2\,x_3 - x_4 == -1$$
$$-x_1 - 3\,x_2 - 3\,x_3 + 2\,x_4 == 4$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 1 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 1 \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ 1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 2 \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ -8 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -8 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 1 \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} 7 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 3 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 0 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ -2 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -4 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	2K	1K	0K
Feed of company 2	11K	6K	0K
Feed of company 3	33K	23K	5K
Feed of company 4	13K	9K	2K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
199K	129K	21K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 14.

1) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

3) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 20714551324

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 2 & -1 & -1 \\ 1 & 4 & -1 & -2 \\ -1 & -2 & 2 & 1 \\ 0 & -3 & 0 & 2 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & 0 & -2 \\ -1 & ? & 0 & -1 \\ 0 & -2 & ? & -3 \\ -2 & 3 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -2 & 6 & 2 \\ -2 & ? & -11 & -4 \\ 0 & 0 & ? & 1 \\ -2 & 5 & -9 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 1 & 0 \\ -2 & ? & 0 & 1 \\ 1 & 0 & ? & 0 \\ -3 & 3 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & 0 & -1 & -1 \\ -4 & ? & 1 & 0 \\ -2 & -1 & ? & 2 \\ 1 & -1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & 0 & -1 & -1 \\ 2 & ? & -1 & 0 \\ -4 & 0 & ? & 6 \\ -1 & 0 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & -1 & 0 \\ 1 & ? & 0 & 2 \\ -2 & -2 & ? & -4 \\ 2 & 1 & -1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & 0 \\ -1 & ? & 1 & 0 \\ 0 & -1 & ? & 0 \\ 1 & 0 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(1 1 2 1 0), (1 -1 2 -1 -2), (2 -2 2 1 2), (2 -1 -1 0 0),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (-6 -6 3 -7) is a linear combination of the vectors

(4 -4 4 2), (2 -2 2 1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} -1 & -1 & 0 \\ 1 & 1 & -1 \\ 1 & 0 & 0 \end{pmatrix}.X.\begin{pmatrix} 2 & -1 & 0 \\ -1 & 1 & 0 \\ -1 & 1 & 1 \end{pmatrix}=\begin{pmatrix} -2 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & 1 & 0 \end{pmatrix}$

1) $\begin{pmatrix} * & * & 0 \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & * & 1 \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & * & * \\ -2 & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & * & * \\ 2 & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & * \\ * & -2 & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & 0 & 3 & 3 \\ 1 & 0 & -1 & 0 \\ 2 & a & 1 & 2 \\ 1 & 0 & -2 & -2 \end{pmatrix}$ has determinant -1?

1) 4 2) -5 3) 5 4) 1 5) -2

Exercise 6

Find the solution of the linear system

$$-2\,x_2 - 7\,x_3 - 5\,x_4 + 10\,x_5 == -3$$
$$2\,x_1 - 5\,x_2 + 3\,x_3 + x_4 - 3\,x_5 == 2$$
$$3\,x_1 + 4\,x_2 - x_3 - 2\,x_4 + 3\,x_5 == 5$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} -3 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 1 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 9 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 1 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ 41 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -5 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -87 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ 40 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -4 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -49 \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 0 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 9 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ -2 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -7 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -53 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	3K	3K	2K
Feed of company 2	3K	3K	2K
Feed of company 3	13K	16K	3K
Feed of company 4	10K	12K	3K

The experts of the livestock farm determined
that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
79K	96K	21K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 1 to be equal to 0.

1) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

2) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=3

5) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=1

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 20730551515

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 3 & 0 & -2 & 2 \\ -3 & 1 & 3 & -3 \\ -1 & 0 & 1 & -1 \\ -2 & 1 & 2 & -1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & 1 & 1 \\ 1 & ? & -2 & -1 \\ 3 & -4 & ? & 0 \\ 0 & 0 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & 0 & 2 & 0 \\ 0 & ? & -3 & 0 \\ 1 & -1 & ? & 1 \\ 0 & -1 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 0 & -2 \\ -2 & ? & 0 & 3 \\ 0 & 0 & ? & -1 \\ 0 & 0 & 1 & ? \end{pmatrix}$ 4) $\begin{pmatrix} ? & -1 & 0 & -1 \\ 0 & ? & 1 & 0 \\ 0 & 1 & ? & 1 \\ 1 & 2 & 2 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & 1 \\ 3 & ? & -1 & -1 \\ -10 & 0 & ? & 7 \\ -4 & 0 & 2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 3 & 2 \\ 2 & ? & -3 & -1 \\ 0 & 0 & ? & 0 \\ 1 & 0 & -2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 0 & -1 \\ 2 & ? & 0 & -2 \\ 0 & 2 & ? & -1 \\ 0 & 0 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(1 1 -2 -1 0), (-2 -2 -2 1 2), (-2 -1 -2 -2 -2), (2 1 2 0 -2),

are independent?

1) 1 2) 2 3) 3 4) 4

Exercise 3

Check whether the vector (n-tuple) (2 1 1 -2) is a linear combination of the vectors

(2 1 1 -2), (4 2 2 -4),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$$\begin{pmatrix} 1 & 1 & 1 \\ 0 & 1 & 0 \\ 0 & -2 & 1 \end{pmatrix} \cdot \left(X - \begin{pmatrix} 1 & 5 & -3 \\ 0 & 2 & -1 \\ 1 & 2 & -1 \end{pmatrix} \right) = \begin{pmatrix} -2 & -11 & 5 \\ 0 & -3 & 1 \\ 0 & 3 & -1 \end{pmatrix}$$

1) $\begin{pmatrix} -2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & -2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & 0 & 1 & 0 \\ 0 & -1 & 1 & 0 \\ -1 & -1 & 2 & 1 \\ 1 & a & -2 & -2 \end{pmatrix}$ has determinant 3?

1) -5 2) 2 3) 1 4) -2 5) -1

Exercise 6

Find the solution of the linear system

$$6x_1 + x_2 + 9x_3 + 4x_4 - x_5 == 3$$
$$-4x_1 - x_2 - 6x_3 - 6x_4 + x_5 == -9$$
$$-5x_1 - x_2 - 8x_3 + x_4 + 3x_5 == 1$$
$$3x_1 + x_2 + 5x_3 + x_4 - 3x_5 == 5$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ -13 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -15 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ -14 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 12 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 4 \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -1 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 11 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -9 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ 9 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -10 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 8 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 5 \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	2K	3K	1K	1K
vegetable flours	1K	2K	1K	1K
fish flours	5K	8K	4K	7K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
16K	10K	48K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

2) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

5) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

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List of exercises 04-Matrices/Linear Systems for identity number: 20902651249

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 2 & -4 & 1 & 0 \\ 3 & -5 & 1 & 1 \\ 3 & -6 & 2 & 0 \\ 3 & -6 & 1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & 2 & -1 & -2 \\ 0 & ? & 0 & -1 \\ -3 & 0 & ? & 0 \\ -3 & 0 & 1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & 0 & 0 \\ -5 & ? & -3 & 1 \\ 3 & 0 & ? & -1 \\ 3 & -2 & -2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 0 & 0 \\ -1 & ? & -2 & -3 \\ 0 & -1 & ? & 1 \\ 0 & -5 & 4 & ? \end{pmatrix}$ 4)
$\begin{pmatrix} ? & -1 & 1 & 0 \\ 0 & ? & -1 & 1 \\ 0 & -1 & ? & 2 \\ -1 & -1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & 0 \\ 3 & ? & 0 & 2 \\ 2 & 1 & ? & 1 \\ -1 & 0 & -1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & 0 & -1 & 1 \\ 0 & ? & -1 & 0 \\ -1 & 0 & ? & 0 \\ 0 & 1 & -2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & 1 & -1 \\ 0 & ? & 0 & 0 \\ 5 & 0 & ? & 3 \\ 3 & -1 & 0 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(1 -1 1 0), (0 2 1 2), (1 -1 2 0),

are independent?

1) 1 2) 2 3) 3

Exercise 3

Check whether the vector (n-tuple) (-2 -7 0) is a linear combination of the vectors

(4 2 -4), (0 0 -4), (2 1 -2), (0 0 4), (2 1 2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 1 & -1 \\ -1 & 2 \end{pmatrix}.X.\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}=\begin{pmatrix} -1 & 1 \\ 2 & -2 \end{pmatrix}$

1) $\begin{pmatrix} -2 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} 0 & * \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -1 & -1 & 0 & 2 \\ 1 & 0 & 0 & 1 \\ 2 & 0 & 1 & 1 \\ a & -1 & 1 & 0 \end{pmatrix}$ has determinant -2?

1) 0 2) 2 3) -3 4) 4 5) 1

Exercise 6

Find the solution of the linear system

$$x_1 - x_2 - 2\,x_4 == -3$$
$$-x_1 + 2\,x_2 - x_3 + 2\,x_4 + 2\,x_5 == -5$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ 0 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 0 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -2 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ 9 \\ ? \\ ? \end{pmatrix}$

3) $\begin{pmatrix} -8 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 0 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -4 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ -7 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 4 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 1 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -9 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -8 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	19K	13K	20K
Feed of company 2	11K	7K	6K
Feed of company 3	20K	13K	14K
Feed of company 4	3K	2K	3K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
132K	89K	127K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 12.

1) Feed 1=4, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

3) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=2

5) Feed 1=?, Feed 2=2, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 21104501336

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} -1 & 3 & -2 & 2 \\ 1 & -1 & 1 & 0 \\ 0 & -1 & 0 & 0 \\ -1 & 2 & -1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -9 & -1 & 4 \\ -1 & ? & 0 & 0 \\ 0 & -4 & ? & 2 \\ 0 & -1 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & -1 & 1 \\ -1 & ? & 0 & 0 \\ 1 & 4 & ? & -1 \\ 0 & -1 & 0 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & 0 & -1 & -2 \\ 0 & ? & -1 & 0 \\ -1 & 1 & ? & 2 \\ 0 & 1 & 1 & ? \end{pmatrix}$ 4)
$\begin{pmatrix} ? & -2 & -1 & -1 \\ 0 & ? & 1 & 0 \\ 0 & -2 & ? & 0 \\ -1 & 1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & 0 & -1 \\ 0 & ? & -1 & 1 \\ 1 & 4 & ? & 3 \\ -1 & 1 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -2 & 1 \\ 2 & ? & 3 & 0 \\ 1 & 0 & ? & 0 \\ -3 & -4 & -4 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & -1 & 2 \\ -1 & ? & 1 & -1 \\ 0 & 1 & ? & 0 \\ 0 & 0 & -1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-4 2 -2 2 0), (-2 -1 0 0 -1), (2 2 0 1 1)
, (1 -2 0 1 -1), (-2 1 -1 1 0), (-4 0 -1 1 -1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5 6) 6

Exercise 3

Check whether the vector (n-tuple) (3 -9 0 3) is a linear combination of the vectors

(-1 0 2 1), (0 -2 0 2), (-2 1 2 2), (-3 1 4 3),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X + \begin{pmatrix} 1 & 1 & -1 \\ 0 & 1 & 0 \\ 2 & 2 & -1 \end{pmatrix}\right) . \begin{pmatrix} 1 & -1 & 1 \\ 0 & 1 & -1 \\ 0 & 1 & 0 \end{pmatrix} = \begin{pmatrix} 1 & -1 & 1 \\ 0 & 2 & -2 \\ 1 & 1 & -1 \end{pmatrix}$

1) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} 2 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & -1 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix
$\begin{pmatrix} 0 & 0 & -2 & 1 \\ 0 & 1 & 2 & 0 \\ 1 & 1 & a & 1 \\ 1 & 0 & 0 & 0 \end{pmatrix}$ has determinant -5?

1) 1 2) 5 3) 4 4) -3 5) -4

Exercise 6

Find the solution of the linear system

$$2x_2 - 3x_3 + 2x_4 == -4$$
$$-x_2 + x_3 - x_4 == -3$$
$$-2x_1 - 2x_2 + 4x_3 - 3x_4 == -10$$
$$-2x_1 - 3x_2 + 6x_3 - 4x_4 == -3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ 4 \end{pmatrix} + \left\langle \begin{pmatrix} -1 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 7 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 0 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 6 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ 9 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -5 \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ -6 \\ ? \\ ? \end{pmatrix}$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ 23 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 3 \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ -2 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	5K	2K	3K
Feed of company 2	7K	3K	4K
Feed of company 3	3K	1K	3K
Feed of company 4	3K	1K	1K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
28K	11K	19K

How many sacks of every company are necessary to reach the recommended composition taking into account that we desire the number of sacks of company 2 to be equal to 1.

1) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

2) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

4) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 21130550766

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} -2 & 4 & 1 & 1 \\ -2 & 4 & 1 & 0 \\ -1 & 2 & 1 & 0 \\ 1 & -3 & -1 & 0 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -7 & -2 & 4 \\ 1 & ? & -1 & 1 \\ 3 & -6 & ? & 4 \\ 0 & -2 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -4 & 0 & -3 \\ 1 & ? & 0 & 1 \\ 3 & -1 & ? & -1 \\ 0 & -2 & 1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -3 & -4 & 2 \\ 0 & ? & 4 & -1 \\ 2 & -1 & ? & -2 \\ -1 & 1 & -1 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & -1 & -2 \\ 0 & ? & -1 & -1 \\ 0 & -1 & ? & 0 \\ 1 & -1 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & 0 \\ -1 & ? & 1 & 0 \\ -1 & -1 & ? & -1 \\ 0 & 1 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 1 & -1 \\ 2 & ? & 0 & -2 \\ 2 & 0 & ? & -2 \\ 2 & 1 & 0 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 1 & 1 \\ 3 & ? & 0 & -1 \\ -1 & -1 & ? & 1 \\ -3 & -3 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 -2 -1 -1 1), (1 -1 1 2 0), (-2 0 1 2 1)
, (1 2 0 1 -1), (-4 -2 -1 -1 1), (-2 0 0 0 0),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5 6) 6

Exercise 3

Check whether the vector (n-tuple) (-9 -1 0 -5) is a linear combination of the vectors

(0 -1 2 0), (-1 2 2 0), (-2 2 1 -2), (-4 4 2 -4), (-2 -2 0 0), (-4 0 1 -2),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} -1 & -2 & 2 \\ 1 & 2 & -1 \\ -2 & -3 & 2 \end{pmatrix}.X.\begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ -1 & 1 & 1 \end{pmatrix}^{-1} = \begin{pmatrix} 1 & 1 & -1 \\ 0 & 1 & 0 \\ 0 & -1 & 0 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} 0 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 0 & * \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix
$\begin{pmatrix} 0 & -1 & 1 & 0 \\ 1 & 0 & 0 & 2 \\ 0 & a & -1 & 1 \\ 1 & -1 & 0 & 1 \end{pmatrix}$ has determinant -1?

1) 3 2) -4 3) -1 4) 5 5) -3

Exercise 6

Find the solution of the linear system

$$2x_1 - 7x_2 + 2x_3 + 2x_4 - 5x_5 + 4x_6 == -5$$
$$x_1 - 2x_2 + 3x_4 + 3x_5 - 3x_6 == -4$$
$$-x_2 + x_3 - 3x_4 - 3x_5 - 2x_6 == 3$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ 5 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -5 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 14 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ 9 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -10 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ 1 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ 3 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} -1 \\ ? \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -7 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 19 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ -8 \\ ? \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 11 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	14K	9K	15K
Feed of company 2	13K	9K	15K
Feed of company 3	11K	8K	13K
Feed of company 4	4K	3K	5K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
115K	78K	129K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 9.

1) Feed 1=?, Feed 2=?, Feed 3=2, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=3, Feed 4=?

3) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

4) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=1, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 30216550613

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 2 & 1 & -1 & 0 \\ 1 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & -5 & 0 \\ 0 & ? & 2 & 0 \\ 0 & -1 & ? & 0 \\ 0 & 0 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -1 & 1 & 0 \\ -1 & ? & -1 & 0 \\ 0 & 0 & ? & 0 \\ 0 & 0 & -1 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -1 & 0 & -2 \\ -2 & ? & 0 & 1 \\ 1 & 2 & ? & 0 \\ 1 & -1 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -1 & 0 & -1 \\ 0 & ? & 1 & 1 \\ 0 & -2 & ? & 0 \\ -1 & 0 & 0 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 0 & 0 \\ -1 & ? & -4 & 7 \\ 1 & -2 & ? & 2 \\ 1 & -1 & 1 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 2 & 1 \\ 1 & ? & 2 & 1 \\ 1 & 0 & ? & 1 \\ 1 & -2 & 3 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & 0 & -1 & -1 \\ 1 & ? & 0 & 0 \\ -1 & -1 & ? & -1 \\ -1 & -2 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-3 1 -1 1 -1), (-2 2 1 1 -2), (1 -1 1 0 2)
, (1 1 2 0 -1), (0 -2 -1 -2 -1), (2 0 2 2 1),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5 6) 6

Exercise 3

Check whether the vector (n-tuple) (-9 3 9 -7) is a linear combination of the vectors

(-2 1 -1 -2), (-4 3 -1 -1), (1 0 0 0), (0 0 -2 -1), (-3 1 -1 -2), (2 -2 0 -1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 2 & 3 & 1 \end{pmatrix} . \left(X + \begin{pmatrix} 1 & 2 & 0 \\ 1 & -1 & -1 \\ -1 & 2 & 1 \end{pmatrix} \right) = \begin{pmatrix} 1 & 2 & 1 \\ 2 & 1 & 0 \\ 3 & 4 & 1 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 2) $\begin{pmatrix} * & 0 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & 1 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 2 & * \\ * & * & * \\ * & * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & * & 2 \\ * & * & * \\ * & * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -2 & a & 2 & 1 \\ 0 & -1 & 1 & 2 \\ 0 & 0 & -1 & -1 \\ 1 & -1 & -1 & -2 \end{pmatrix}$ has determinant 3?

1) -3 2) 4 3) 3 4) 2 5) -2

Exercise 6

Find the solution of the linear system

$$-x_1 - x_2 + 3\,x_3 == 1$$
$$-x_1 + x_3 == 0$$
$$-x_1 - x_2 + 2\,x_3 == -1$$
$$2\,x_1 - x_2 + 2\,x_3 == 5$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} 5 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 6 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} 6 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 9 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ 5 \end{pmatrix} + \left\langle \begin{pmatrix} 5 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -2 \end{pmatrix}, \begin{pmatrix} ? \\ 3 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ 1 \\ ? \end{pmatrix}$

4) $\begin{pmatrix} 0 \\ ? \\ ? \end{pmatrix}$

5) $\begin{pmatrix} ? \\ ? \\ 2 \end{pmatrix}$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	animal flours	vegetable flours	fish flours
Feed of company 1	5K	8K	4K
Feed of company 2	1K	0K	1K
Feed of company 3	1K	2K	1K
Feed of company 4	11K	17K	9K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
12K	20K	10K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 4.

1) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=1, Feed 4=?

4) Feed 1=1, Feed 2=?, Feed 3=?, Feed 4=?

5) Feed 1=2, Feed 2=?, Feed 3=?, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 30312650522

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 1 & 2 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & -1 & 1 & 0 \\ 1 & -1 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -2 & 0 & 0 \\ 0 & ? & 0 & 0 \\ 0 & 1 & ? & 0 \\ -1 & 3 & 0 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -3 & 1 & 1 \\ -4 & ? & -3 & 0 \\ 2 & -2 & ? & 0 \\ -5 & 5 & -3 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & -1 & -1 \\ 1 & ? & 0 & 0 \\ 1 & 0 & ? & 0 \\ 0 & 1 & 0 & ? \end{pmatrix}$ 4)

$\begin{pmatrix} ? & -2 & 0 & -3 \\ -2 & ? & 2 & 0 \\ -1 & -1 & ? & -2 \\ -3 & 2 & 3 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -2 & 2 & -2 \\ 1 & ? & 0 & 1 \\ 0 & 1 & ? & 1 \\ -2 & -5 & 2 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & -1 & 0 \\ -1 & ? & 2 & 1 \\ 1 & -2 & ? & -1 \\ 0 & -2 & 2 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 1 & -1 \\ -1 & ? & 0 & -2 \\ -1 & -3 & ? & -2 \\ 0 & 0 & 1 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(0 -1 0 1), (2 1 2 1), (0 1 2 0), (2 2 1 -2), (2 2 2 0),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-4 -2 -2) is a linear combination of the vectors

(4 2 2), (2 1 1),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}.X + \begin{pmatrix} 1 & 1 \\ -5 & -4 \end{pmatrix} = \begin{pmatrix} 2 & 1 \\ -5 & -3 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 2 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -1 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 0 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 1 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix

$\begin{pmatrix} -2 & -1 & 1 & 1 \\ 1 & 0 & 0 & -2 \\ 0 & 1 & 0 & -2 \\ 1 & -1 & 1 & a \end{pmatrix}$ has determinant 3?

1) 1 2) 5 3) -2 4) 4 5) 3

Exercise 6

Find the solution of the linear system

$$x_1 + x_2 + 4\,x_3 - x_4 == -1$$
$$-5\,x_1 - 4\,x_2 + 3\,x_3 - 2\,x_4 == 5$$

taking as parameters, if it is necessary, the last variables and solving for the first ones (that is to say, apply Gauss elimination technique selecting columns from left to right). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ ? \\ 0 \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -23 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -6 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} ? \\ ? \\ ? \\ 10 \end{pmatrix} + \left\langle \begin{pmatrix} 9 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ -6 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 6 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} 16 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -5 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ 9 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ 3 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} -4 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -2 \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} ? \\ ? \\ -2 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -22 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 8 \\ ? \\ ? \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used. Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	2K	0K	6K	5K
vegetable flours	1K	2K	4K	3K
fish flours	6K	4K	21K	17K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
36K	33K	143K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 13.

1) Feed 1=3, Feed 2=?, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=?, Feed 3=0, Feed 4=?

3) Feed 1=?, Feed 2=0, Feed 3=?, Feed 4=?

4) Feed 1=?, Feed 2=4, Feed 3=?, Feed 4=?

5) Feed 1=?, Feed 2=?, Feed 3=4, Feed 4=?

Mathematics 1 - ADE/FyCo - 2020/2021
List of exercises 04-Matrices/Linear Systems for identity number: 30509500045

Exercise 1

Compute the inverse of the matrix $\begin{pmatrix} 0 & 1 & -2 & -2 \\ 0 & 1 & 0 & -1 \\ 1 & 0 & 1 & -1 \\ -1 & 1 & 0 & 1 \end{pmatrix}$.

1) $\begin{pmatrix} ? & -6 & -3 & 3 \\ -1 & ? & 1 & -1 \\ 0 & 1 & ? & -1 \\ 0 & -1 & -1 & ? \end{pmatrix}$ 2) $\begin{pmatrix} ? & -5 & 4 & 3 \\ 1 & ? & 2 & 2 \\ -1 & 2 & ? & -1 \\ 1 & -3 & 2 & ? \end{pmatrix}$ 3) $\begin{pmatrix} ? & -2 & 0 & -1 \\ 1 & ? & 0 & 2 \\ -1 & -2 & ? & 0 \\ 0 & 1 & 1 & ? \end{pmatrix}$ 4)
$\begin{pmatrix} ? & -1 & -1 & 0 \\ 0 & ? & -1 & 0 \\ 0 & 1 & ? & -1 \\ 0 & 1 & 2 & ? \end{pmatrix}$ 5) $\begin{pmatrix} ? & -1 & 1 & 1 \\ 0 & ? & 0 & 1 \\ 1 & 0 & ? & 0 \\ 1 & -1 & 0 & ? \end{pmatrix}$ 6) $\begin{pmatrix} ? & -1 & 2 & -1 \\ 3 & ? & 1 & -1 \\ 0 & 1 & ? & 0 \\ 0 & 1 & 1 & ? \end{pmatrix}$ 7) $\begin{pmatrix} ? & -1 & 4 & -1 \\ -1 & ? & -1 & 0 \\ 1 & -1 & ? & -1 \\ 5 & -3 & 13 & ? \end{pmatrix}$

Exercise 2

How many of the vectors (n-tuples)

(-2 1 2 1), (-2 -1 -2 1), (2 1 -2 0), (0 2 1 1), (-4 -2 -4 2),

are independent?

1) 1 2) 2 3) 3 4) 4 5) 5

Exercise 3

Check whether the vector (n-tuple) (-7 2 -5) is a linear combination of the vectors

(-1 1 -2), (-2 2 -4),

1) Yes 2) No

Exercise 4

Solve for the matrix X in the following equation:

$\left(X - \begin{pmatrix} 2 & 3 \\ 1 & 2 \end{pmatrix}\right) \cdot \begin{pmatrix} 1 & -1 \\ -1 & 2 \end{pmatrix} = \begin{pmatrix} -1 & -1 \\ 3 & -6 \end{pmatrix}$

1) $\begin{pmatrix} -1 & * \\ * & * \end{pmatrix}$ 2) $\begin{pmatrix} 1 & * \\ * & * \end{pmatrix}$ 3) $\begin{pmatrix} * & -2 \\ * & * \end{pmatrix}$ 4) $\begin{pmatrix} * & 0 \\ * & * \end{pmatrix}$ 5) $\begin{pmatrix} * & 2 \\ * & * \end{pmatrix}$

Exercise 5

Compute the value for parameter a in such a way that the matrix
$\begin{pmatrix} 0 & 1 & 1 & -2 \\ 1 & 1 & -2 & a \\ 1 & 0 & 2 & 1 \\ 1 & 1 & 2 & 2 \end{pmatrix}$ has determinant -19?

1) 5 2) 3 3) -5 4) 2 5) -3

Exercise 6

Find the solution of the linear system

$$x_1 + 4\,x_2 + 3\,x_3 + 2\,x_4 + 3\,x_5 == -4$$
$$9\,x_1 + 6\,x_2 - x_3 + x_5 == 10$$
$$5\,x_1 + 5\,x_2 + x_3 + x_4 + 2\,x_5 == 3$$

taking as parameters, if it is necessary, the first variables and solving for the last ones (that is to say, apply Gauss elimination technique selecting columns from right to left). Express the solution by means of linear combinations.

1) $\begin{pmatrix} ? \\ ? \\ -2 \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -8 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -4 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 0 \\ ? \end{pmatrix} \right\rangle$

2) $\begin{pmatrix} -1 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ 12 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 5 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ -1 \\ ? \end{pmatrix} \right\rangle$

3) $\begin{pmatrix} ? \\ ? \\ ? \\ -5 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ -9 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -1 \end{pmatrix}, \begin{pmatrix} ? \\ -5 \\ ? \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ 4 \\ ? \\ ? \\ ? \end{pmatrix} \right\rangle$

4) $\begin{pmatrix} ? \\ ? \\ ? \\ -3 \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ -10 \\ ? \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 7 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -3 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ 10 \\ ? \\ ? \end{pmatrix} \right\rangle$

5) $\begin{pmatrix} 0 \\ ? \\ ? \\ ? \\ ? \end{pmatrix} + \left\langle \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ -9 \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ 7 \\ ? \end{pmatrix}, \begin{pmatrix} ? \\ ? \\ ? \\ ? \\ 1 \end{pmatrix} \right\rangle$

Exercise 7

In a livestock farm, animal feed from several companies is used.
Every company produces feed combining different types of flour in different proportions as we can see in the table below which indicates the amount of kilograms of every component that includes the sack of flour of each company:

	Feed of company 1	Feed of company 2	Feed of company 3	Feed of compa
animal flours	3K	6K	7K	4K
vegetable flours	10K	17K	25K	14K
fish flours	2K	4K	5K	3K

The experts of the livestock farm determined that every week each animal needs the following composition:

animal flours	vegetable flours	fish flours
65K	213K	45K

How many sacks of every company are necessary to reach the recommended composition taking into account that, to properly store the feed, the total number of sacks for every animal has to be equal to 11.

1) Feed 1=?, Feed 2=2, Feed 3=?, Feed 4=?

2) Feed 1=?, Feed 2=3, Feed 3=?, Feed 4=?

3) Feed 1=?, Feed 2=?, Feed 3=?, Feed 4=0

4) Feed 1=?, Feed 2=?, Feed 3=3, Feed 4=?

5) Feed 1=0, Feed 2=?, Feed 3=?, Feed 4=?