

1. Vypočítajte skalárny a vektorový súčin vektorov.

$$[3,2,5] \text{ a } [-1,2,4]$$

$$21; [-2, -17, 8]$$

$$[-3,1,5] \text{ a } [-1,2,4]$$

$$25; [-6, 7, -5]$$

$$[-3,6,12] \text{ a } [-1,2,4]$$

$$63; [0, 0, 0]$$

2. Vypočítajte uhol priamok  $2x+3y+6=0$  a  $3x-2y+2=0$ .

$$90^\circ$$

$$x = 2 + t$$

$$x = 2 + 2t$$

3. Vypočítajte uhol priamok  $y = 3 - 2t$  ;  $t \in R$  a  $y = 3 - t$  ;  $t \in R$ .

$$62^\circ$$

$$z = -1 + 3t$$

$$z = -1 - 4t$$

$$x = 2 + t$$

4. Určte, či sú priamky  $y = 3 - 2t$  ;  $t \in R$

$$z = -1 + 3t$$

$$x = 2t$$

a  $y = 4 - t$  ;  $t \in R$  rôznobežné alebo mimobežné.

mimobežné

$$z = -1 - 4t$$

5. Určte prienik priamky  $y = 3 - 2t$  ;  $t \in R$  s rovinou  $2x+3y-z=6$ .

$$z = -1 + 3t$$

$$\left[ \frac{22}{7}, \frac{13}{5}, -\frac{16}{35} \right]$$

6. Určte prienik rovín  $2x+3y-z=6$  a  $x=y-z$ .

$$x = \frac{6}{5} - \frac{2}{5}t; y = \frac{6}{5} + \frac{3}{5}t; z = t; t \in R$$

7. Určte veľkosť vektora  $[-3,1,5]$ .

$$\sqrt{35}$$

8. Zobrazte uhol vektorov  $[2,1]$  a  $[5,3]$ .

9. Nakreslite pravidelný päťuholník so stredom v bode  $[0;0]$  a vrcholom v bode  $[1;0]$ .

10. Nakreslite pravidelný osemuholník so stredom v bode  $[0;0]$  a vrcholom v bode  $[1;0]$ .

11. Nakreslite pravidelný dvanásťuholník so stredom v bode  $[0;0]$  a vrcholom v bode  $[1;0]$ .

12. Zobrazte vektory  $[1,2,3]$  a  $[-1,3,2]$ . Zobrazte vektor kolmý na uvedené vektory.

13. Zobrazte priamku prechádzajúcu bodmi  $[2,3]$  a  $[-3,-7]$ . Určte jej rovnicu.

$$y = 2x - 1$$

14. Zobrazte parabolu prechádzajúcu bodmi  $[2,3]$ ,  $[0,8]$  a  $[-3,-7]$ . Určte jej rovnicu.

$$y = \frac{-3}{2}x^2 + \frac{1}{2}x + 8$$

15. Zobrazte rovinu prechádzajúcu bodmi  $[2,3,4]$ ,  $[0,3,2]$  a  $[-3,-3,-1]$ . Určte jej rovnicu.

$$z = x + 2$$

16. Zobrazte regresnú priamku pre body  $[-3,-5]$ ,  $[-2,-2]$ ,  $[-1,-2]$ ,  $[0,1]$ ,

$$y = \frac{37}{28}x - \frac{3}{7}$$

$[1,-2]$ ,  $[2,3]$  a  $[3,4]$ . Určte jej rovnicu.

17. Zobrazte regresnú parabolu pre body  $[-3,-5]$ ,  $[-2,-2]$ ,  $[-1,-2]$ ,  $[0,1]$ ,

$$y = \frac{1}{28}x^2 + \frac{37}{28}x - \frac{4}{7}$$

$[1,-2]$ ,  $[2,3]$  a  $[3,4]$ . Určte jej rovnicu.

18. Zobrazte kolmicu na rovinu  $2x+y-3z=4$  z bodu  $[-3,5,2]$ .

$$\left[ -\frac{10}{7}, \frac{81}{14}, \frac{-5}{14} \right]; \frac{11 \cdot \sqrt{14}}{14}$$

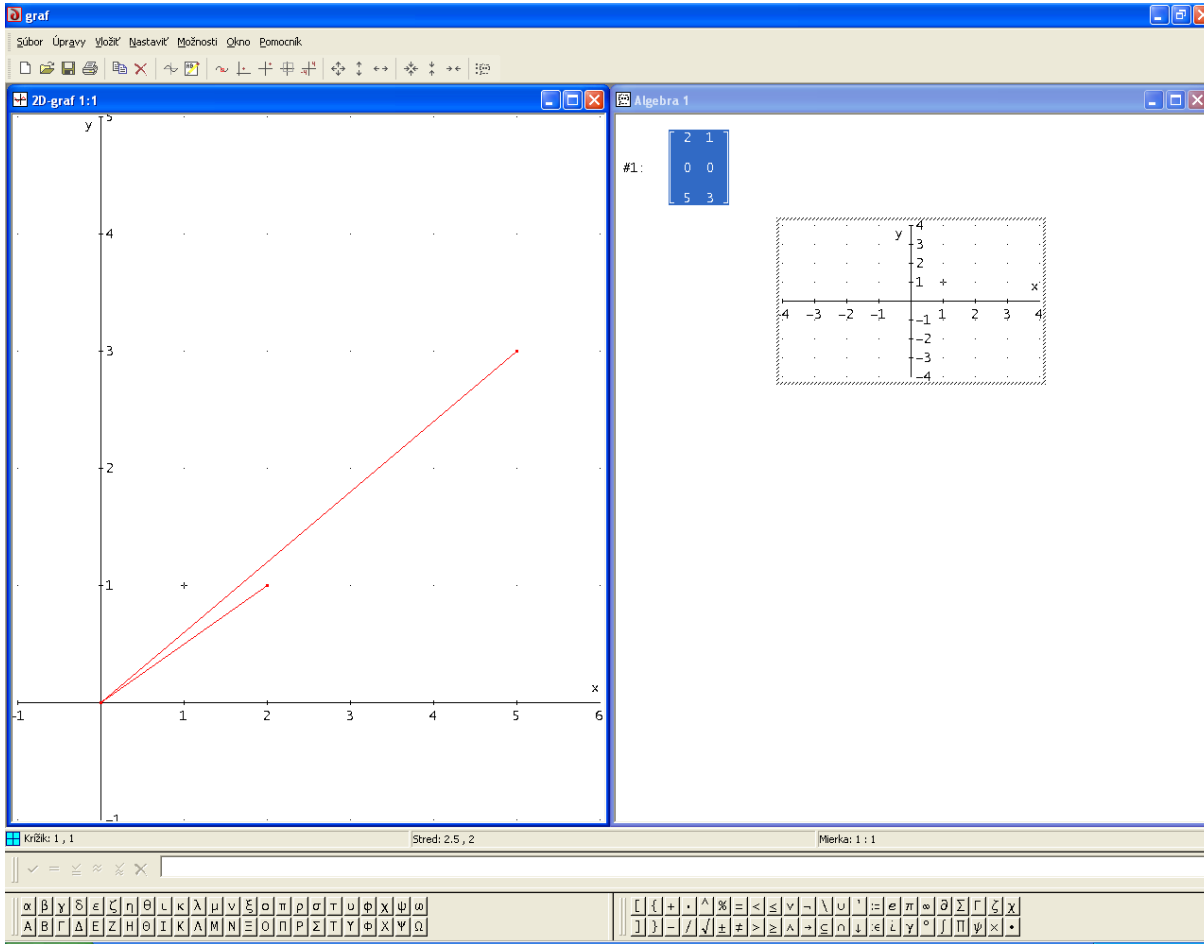
Určte jej priesečník s rovinou a vypočítajte vzdialenosť bodu od roviny.

19. Vypočítajte os úsečky s hraničnými bodmi  $[2,1]$  a  $[7,-2]$  a zobrazte ju.

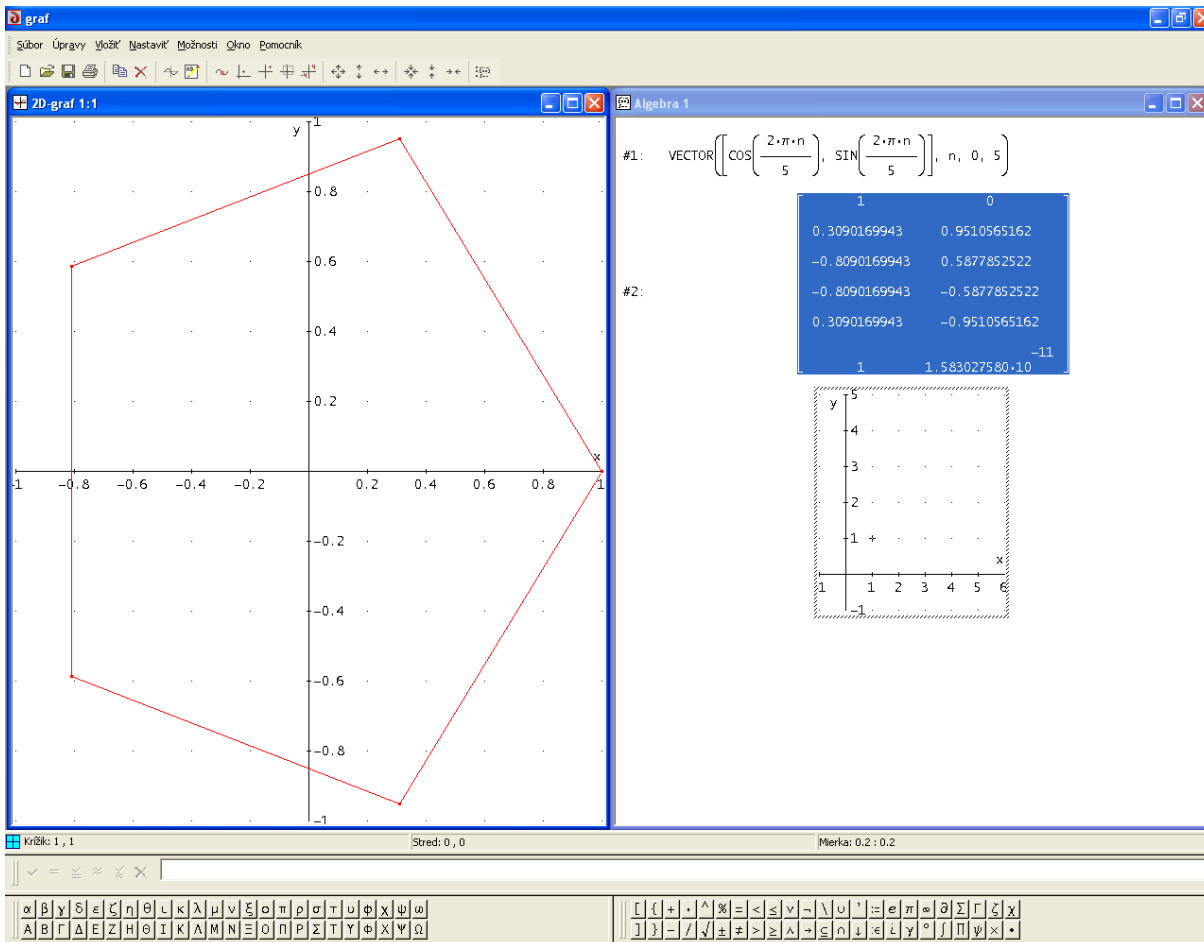
$$x = \frac{9}{2} + 3t; y = -\frac{1}{2} + 5t; t \in R$$

# Grafická príloha s postupom riešenia

8.



9.



10.

The screenshot shows a software interface with two main windows: "2D graf 1:1" and "Algebra 1".

**2D graf 1:1:** A 2D coordinate system with x and y axes ranging from -1 to 1. A regular octagon is plotted, centered at the origin (0,0). The vertices are located at approximately (±0.8, 0), (±0.717, ±0.717), and (0, ±0.8).

**Algebra 1:**

- #2: A 2x2 matrix:
 
$$\begin{bmatrix} -0.8090169943 & -0.5877852522 \\ 0.3090169943 & -0.9510565162 \end{bmatrix}$$
- #3: VECTOR  $\left[ \left[ \cos\left(\frac{2 \cdot \pi \cdot n}{8}\right), \sin\left(\frac{2 \cdot \pi \cdot n}{8}\right) \right], n, 0, 8 \right]$
- #4: A 2x2 matrix:
 
$$\begin{bmatrix} 1 & 0 \\ 0.7071067811 & 0.7071067811 \\ 0 & 1 \\ -0.7071067811 & 0.7071067811 \\ -1 & 0 \\ -0.7071067811 & -0.7071067811 \\ -6.698157480 \cdot 10^{-12} & -1 \\ 0.7071067811 & -0.7071067811 \\ 1 & -1.915787259 \cdot 10^{-11} \end{bmatrix}$$

At the bottom, there is a toolbar with mathematical symbols and a status bar showing "Křížek: 1, 1", "Střed: 0, 0", and "Měřítko: 0.2 : 0.2".

11.

The screenshot shows a software interface with two main windows: "2D graf 1:1" and "Algebra 1".

**2D graf 1:1:** A 2D coordinate system with x and y axes ranging from -1 to 1. A regular dodecagon is plotted, centered at the origin (0,0). The vertices are located at approximately (±0.8, 0), (±0.7, ±0.7), and (0, ±0.8).

**Algebra 1:**

- #4: A 2x2 matrix:
 
$$\begin{bmatrix} -0.7071067811 & 0.7071067811 \\ -1 & 0 \\ -0.7071067811 & -0.7071067811 \\ -6.698157480 \cdot 10^{-12} & -1 \\ 0.7071067811 & -0.7071067811 \\ 1 & -1.915787259 \cdot 10^{-11} \end{bmatrix}$$
- #5: VECTOR  $\left[ \left[ \cos\left(\frac{\pi \cdot n}{6}\right), \sin\left(\frac{\pi \cdot n}{6}\right) \right], n, 0, 12 \right]$
- #6: A 2x2 matrix:
 
$$\begin{bmatrix} 1 & 0 \\ 0.8660254037 & 0.5 \\ 0.5 & 0.8660254037 \\ -2.950165481 \cdot 10^{-12} & 1 \\ -0.5 & 0.8660254037 \\ -0.8660254037 & 0.5 \\ -1 & 4.200460781 \cdot 10^{-12} \\ -0.8660254037 & -0.5 \\ -0.5 & -0.8660254037 \\ 0 & -1 \\ 0.5 & -0.8660254037 \\ 0.8660254037 & -0.5 \\ 1 & -7.867746026 \cdot 10^{-12} \end{bmatrix}$$

At the bottom, there is a toolbar with mathematical symbols and a status bar showing "Křížek: 1, 1", "Střed: 0, 0", and "Měřítko: 0.2 : 0.2".

12.

The screenshot shows a software interface with two main windows: "3D graf 1:1" and "Algebra 1".

**3D graf 1:1:** Displays a 3D coordinate system with x, y, and z axes. A cube is drawn with vertices at (-5, -5, -5) and (5, 5, 5). A plane is shown intersecting the cube, with its equation  $z = 2x + 3y - 5$  indicated.

**Algebra 1:** Shows algebraic operations:

- #1: Matrix  $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 0 \\ -1 & 3 & 2 \end{bmatrix}$
- #2: Vector operation  $[1, 2, 3] \times [-1, 3, 2] = [-5, -5, 5]$
- #3: Matrix  $\begin{bmatrix} 0 & 0 & 0 \\ -5 & -5 & 5 \end{bmatrix}$

At the bottom, there is a toolbar with mathematical symbols and a status bar showing "Okno: 24.644, 14.989, 12", "Stred: 0, 0, 0", and "Dĺžka: 10 : 10 : 10".

13.

The screenshot shows a software interface with two main windows: "2D graf 1:1" and "Algebra 1".

**2D graf 1:1:** Displays a 2D coordinate system with x and y axes. A red line is plotted, representing the linear fit equation  $y = 2x - 1$ .

**Algebra 1:** Shows the linear fit equation:  $FIT[x, a \cdot x + b], \begin{bmatrix} 2 & 3 \\ -3 & -7 \end{bmatrix} = 2 \cdot x - 1$ . Below the equation is a zoomed-in view of the line on a grid.

At the bottom, there is a toolbar with mathematical symbols and a status bar showing "Křížek: 1, 1", "Stred: 0, 0", and "Mierka: 1 : 2".

14.

The screenshot shows a software interface with two main windows. The left window, titled "2D graf 1:1", displays a 2D coordinate system with a grid. A blue parabola is plotted, opening downwards with its vertex at (0, 8) and x-intercepts at (-2, 0) and (2, 0). The axes range from -5 to 5 on the x-axis and -10 to 10 on the y-axis. The right window, titled "Algebra 1", shows the following mathematical expression:

$$\#1: \text{FIT} \left[ [x, a \cdot x + b \cdot x + c], \begin{bmatrix} 2 & 3 \\ 0 & 8 \\ -3 & -7 \end{bmatrix} \right] = -\frac{3 \cdot x}{2} + \frac{x}{2} + 8$$

At the bottom of the interface, there is a toolbar with mathematical symbols and a keyboard layout. The taskbar at the very bottom shows the Windows Start button, the application name "graf", and the active window "Dok1 - Microsoft Word".

15.

The screenshot shows a software interface with two main windows. The left window, titled "3D graf 1:1", displays a 3D coordinate system with a grid. A blue plane is plotted, tilted in the 3D space. The axes are labeled x, y, and z, with the z-axis ranging from -5 to 5. The right window, titled "Algebra 1", shows the following mathematical expression:

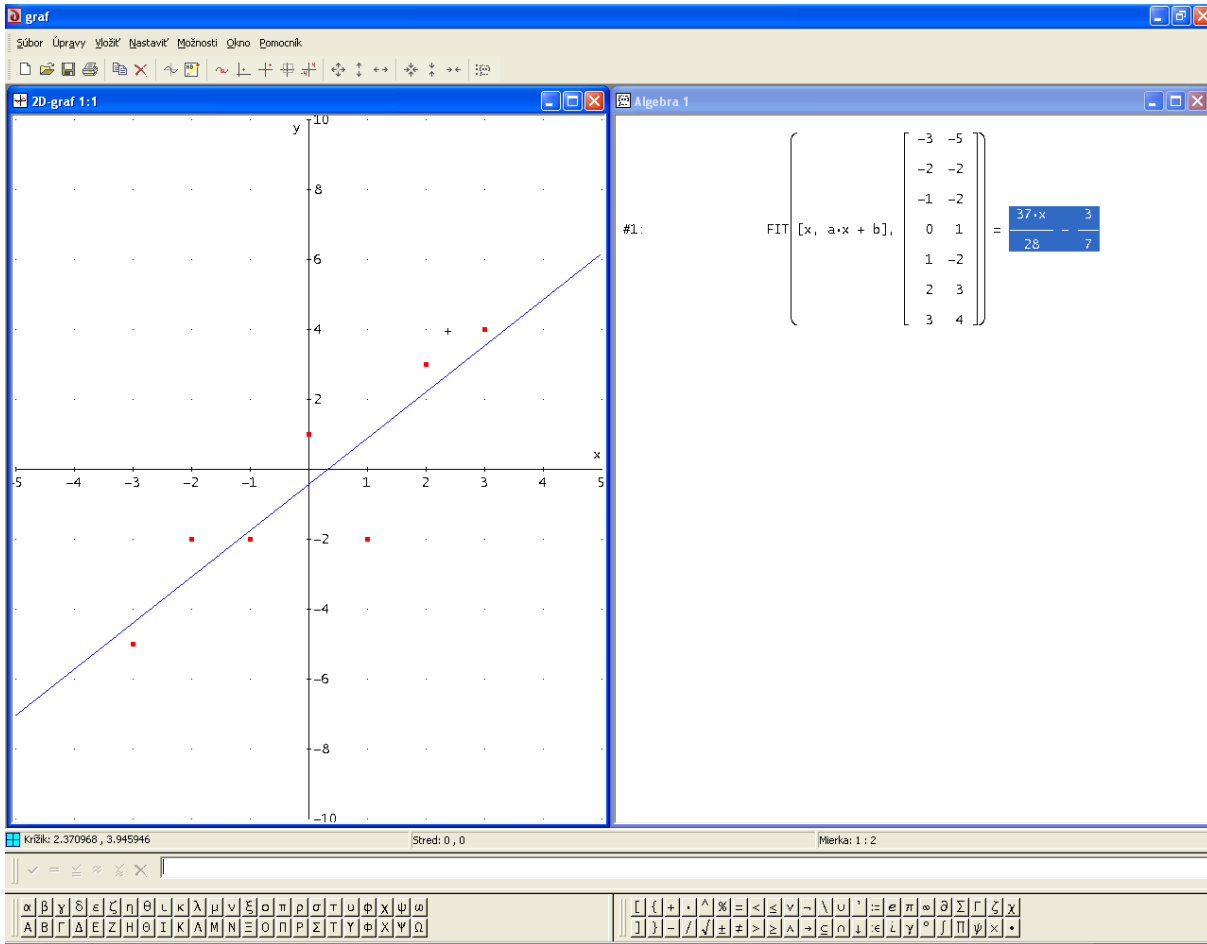
$$\#1: \text{FIT} \left[ [x, y, a \cdot x + b \cdot y + c], \begin{bmatrix} 2 & 3 & 4 \\ 0 & 3 & 2 \\ -3 & -3 & -1 \end{bmatrix} \right] = x + 2$$

Below this, the second equation is shown:

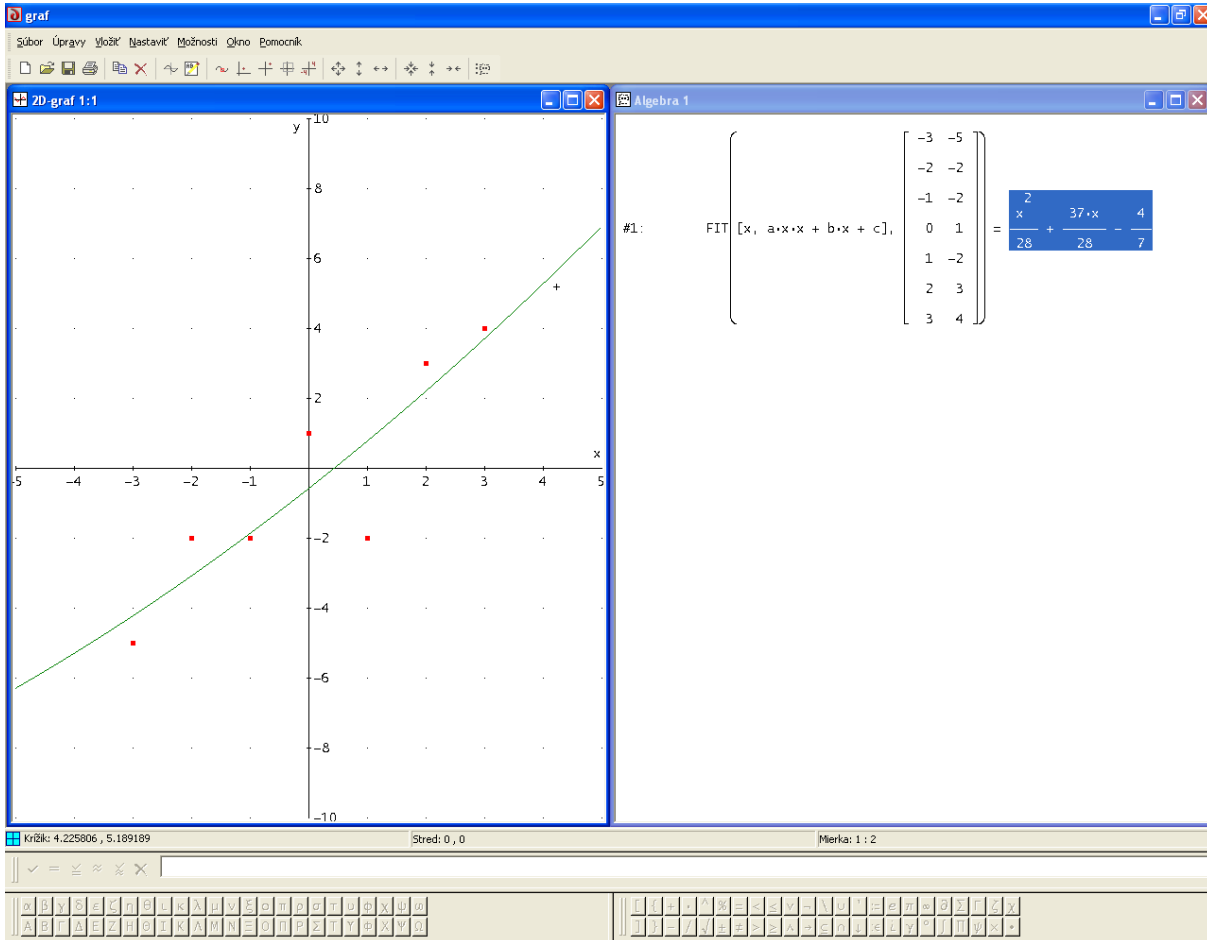
$$\#2: z = x + 2$$

At the bottom of the interface, there is a toolbar with mathematical symbols and a keyboard layout. The taskbar at the very bottom shows the Windows Start button, the application name "graf", and the active window "Dok1 - Microsoft Word".

16.



17.

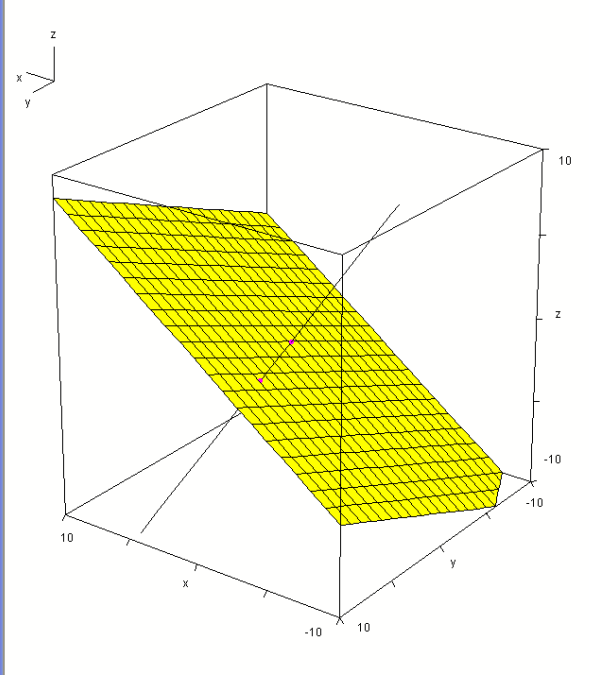


18.

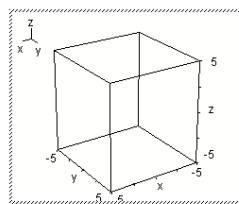
graf

Súbor Úpravy Vložiť Zadáť Zjednodušiť Riešiť Výpočet Možnosti Oľno Pomocník

3D graf 1:1 Algebra 1



#1:  $z = \frac{2 \cdot x + y - 4}{3}$



#2:  $[-3, 5, 2]$

#3:  $[-3 + 2 \cdot t, 5 + t, 2 - 3 \cdot t]$

#4:  $2 \cdot (-3 + 2 \cdot t) + (5 + t) - 3 \cdot (2 - 3 \cdot t) = 4$

#5:  $\text{SOLVE}(2 \cdot (-3 + 2 \cdot t) + (5 + t) - 3 \cdot (2 - 3 \cdot t) = 4, t)$

#6:  $t = \frac{11}{14}$

#7:  $\left[-3 + 2 \cdot \frac{11}{14}, 5 + \frac{11}{14}, 2 - 3 \cdot \frac{11}{14}\right]$

#8:  $\left[-\frac{10}{7}, \frac{81}{14}, -\frac{5}{14}\right]$

#9:  $\left|[-3, 5, 2] - \left[-\frac{10}{7}, \frac{81}{14}, -\frac{5}{14}\right]\right| = \frac{11 \cdot \sqrt{14}}{14}$

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$\text{abs}([-3, 5, 2]-[-10/7, 81/14, -5/14])=$

Algebra 1

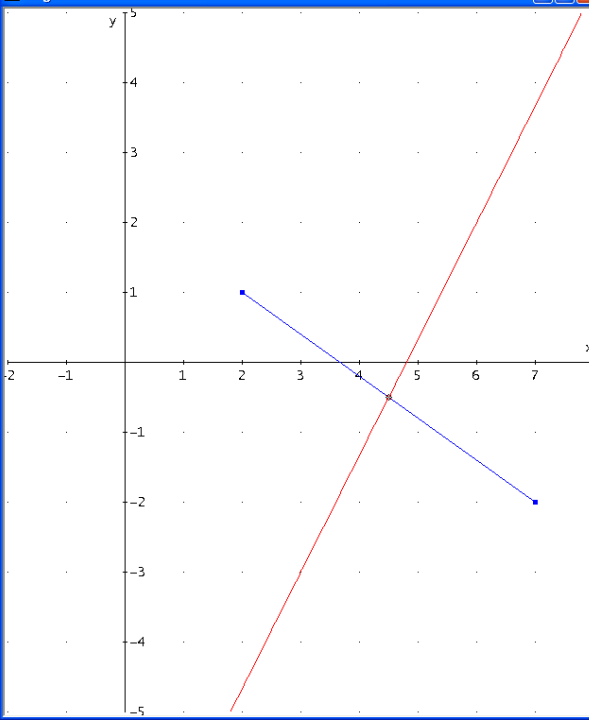
Algebra 1

19.

graf

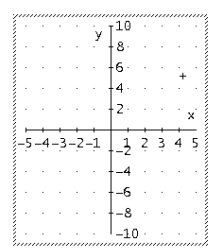
Súbor Úpravy Vložiť Nastaviť Možnosti Oľno Pomocník

2D graf 1:1 Algebra 1



#1:  $[2, 1]$

#2:  $[7, -2]$



#3:  $\begin{bmatrix} 2 & 1 \\ 7 & -2 \end{bmatrix}$

#4:  $\frac{[2, 1] + [7, -2]}{2} = \left[\frac{9}{2}, -\frac{1}{2}\right]$

#5:  $[2, 1] - [7, -2] = [-5, 3]$

#6:  $\frac{9}{2} + 3 \cdot t, -\frac{1}{2} + 5 \cdot t$

Křížek: 4.5, -0.5 Střed: 3, 0 Měrika: 1:1

$\text{abs}([-3, 5, 2]-[-10/7, 81/14, -5/14])=$

Algebra 1

Algebra 1