

Lineární rovnice – Gaussova metoda

1. Řešte soustavu rovnic:

$$x_1 + x_2 + 5x_3 = -7$$

$$x_1 + 3x_2 + x_3 = 5$$

$$2x_1 + x_2 + x_3 = 2$$

$$2x_1 + 3x_2 - 3x_3 = 14$$

$$\left(\begin{array}{ccc|c} 1 & 1 & 5 & -7 \\ 1 & 3 & 1 & 5 \\ 2 & 1 & 1 & 2 \\ 2 & 3 & -3 & 14 \end{array}\right) \approx \left(\begin{array}{ccc|c} 1 & 1 & 5 & -7 \\ 0 & 2 & -4 & 12 \\ 0 & -5 & -1 & -8 \\ 0 & -3 & -5 & 4 \end{array}\right) \approx \left(\begin{array}{ccc|c} 1 & 1 & 5 & -7 \\ 0 & 2 & -4 & 12 \\ 0 & -5 & -1 & -8 \\ 0 & 0 & -22 & 44 \end{array}\right) \approx \left(\begin{array}{ccc|c} 1 & 1 & 5 & -7 \\ 0 & 2 & -4 & 12 \\ 0 & 0 & -22 & 44 \\ 0 & 0 & -22 & 44 \end{array}\right)$$

$$-22x_3 = 44$$

$$x_3 = -2$$

$$2x_2 - 4x_3 = 12$$

$$2x_2 - 4 \cdot (-2) = 12$$

$$2x_2 = 4$$

$$x_2 = 2$$

$$1x_1 + x_2 + 5x_3 = -7$$

$$x_1 + 2 - 10 = -7$$

$$x_1 = -7 + 8$$

$$x_1 = 1$$

$$x = (1; 2; -2)$$

2. Řešte soustavu rovnic:

$$3x_1 + 2x_2 + 5x_3 + 2x_4 + 7x_5 = 0$$

$$6x_1 + 4x_2 + 7x_3 + 4x_4 + 5x_5 = 0$$

$$3x_1 + 2x_2 - x_3 + 2x_4 - 11x_5 = 0$$

$$6x_1 + 4x_2 + x_3 + 4x_4 - 13x_5 = 0$$

$$A|B = \left(\begin{array}{ccccc|c} 3 & 2 & 5 & 2 & 7 & 0 \\ 6 & 4 & 7 & 4 & 5 & 0 \\ 3 & 2 & -1 & 2 & -11 & 0 \\ 6 & 4 & 1 & 4 & -13 & 0 \end{array} \right) \approx \left(\begin{array}{ccccc|c} 3 & 2 & 5 & 2 & 7 & 0 \\ 0 & 0 & -3 & 0 & -9 & 0 \\ 0 & 0 & -6 & 0 & -18 & 0 \\ 0 & 0 & -6 & 0 & -18 & 0 \end{array} \right) \approx \left(\begin{array}{ccccc|c} 3 & 2 & 5 & 2 & 7 & 0 \\ 0 & 0 & 1 & 0 & 3 & 0 \\ 0 & 0 & 1 & 0 & 3 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array} \right) \approx \left(\begin{array}{ccccc|c} 3 & 2 & 5 & 2 & 7 & 0 \\ 0 & 0 & 1 & 0 & 3 & 0 \end{array} \right)$$

$$h(A|B)=2$$

$$n = 5$$



volíme $5 - 2 = 3$ parametry

$$x_3 + 3x_5 = 0$$

Zvolíme např.: $x_5 = p$

$$\Rightarrow x_3 = -3p$$

$$3x_1 + 2x_2 + 5x_3 + 2x_4 + 7x_5 = 0$$

Zvolíme např.: $x_1 = q$; $x_2 = r$

$$3q + 2r + 5 \cdot (-3p) + 2x_4 + 7p = 0$$



$$x_4 = 4p - \frac{3}{2}q - r$$

$$x = \left(q; r; -3p; 4p - \frac{3}{2}q - r; p \right)$$