

## Lineární (ne)rovnice

$$1) 4x + 7 - 7(x-6) + 5 = 0 \quad |+3x \quad /-3$$

$$-3x + 7 + 42 + 5 = 0 \quad |3x = 54 \quad |/3$$

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$$2) \frac{4x-7}{2} - \frac{(x-4)}{6} \geq 2x-3 \quad | \cdot 6$$

$$2(4x-7) - (x-4) \geq 12x - 18$$

$$-x + 4 \leq 3 \quad |+x \quad |x \leq 1$$

$$-x \geq -1 \quad |(-1)$$

$$x \in (-\infty, 1)$$

$$3) x^2 + 6x + 8 = 0$$

$$x_{1,2} = \frac{-6 \pm \sqrt{36-4 \cdot 1 \cdot 8}}{2}$$

$$= \frac{-6 \pm 2}{2} < \begin{cases} -2 \\ -4 \end{cases}$$

$$(x+6)(x+2) = 0 \quad \Delta = (A+B) \cdot (A-B)$$

$$4) (x-1)^2 - (x+1)^2 < 8$$

$$\begin{cases} -2x - 2x < 8 \\ -4x < 8 \\ x > -2 \end{cases} \quad x \in (-2, \infty)$$

$$\Rightarrow [(x-1) + (x+1)][(x-1) - (x+1)] < 8$$

$$2x \cdot (-2) < 8$$

$$5) \frac{(x-6)(x+2)}{x+2} > 0 \quad \begin{array}{c} - - + + + \\ \textcircled{-} \textcircled{-} \textcircled{-} \textcircled{+} \textcircled{+} \end{array} \quad \mathbb{R}$$

$$x \in (-\infty, -2) \cup (6, \infty)$$

Pozn.  $(-x+6) = (6-x)$

$$6) (x+2)(x+7) \geq 0 \quad | : (x^2+2)$$

$$x^2 \geq 0 \quad \forall x \in \mathbb{R} \quad x+7 \geq 0 \quad x \geq -7$$

$$x+2 \geq 2 > 0 \quad x \in (-7, \infty)$$

$$7) a) \frac{2x-5}{x+3} = 0 \quad |(\text{ne}) \quad x \neq -3$$

$$2x-5=0 \quad x=\frac{5}{2}$$

$$b) \frac{2x-5}{x+3} \geq 0$$

$$\text{I) } \begin{array}{c} - - + + \\ \textcircled{-} \textcircled{-} \textcircled{+} \textcircled{+} \end{array} \quad \text{II) } \begin{array}{c} x \in (-\infty, -3) \\ x+3 < 0 \end{array}$$

$$x \in (-\infty, -3) \cup (\frac{5}{2}, \infty)$$

$$\text{III) } \begin{array}{c} 2x-5 \leq 0 \\ x \leq \frac{5}{2} \\ x \in (-\infty, \frac{5}{2}) \end{array}$$

$$x \in (-\infty, -3) \cup (\frac{5}{2}, \infty)$$

$$8) 4x^2 + x = 0$$

$$x(4x+1) = 0 \quad x_1 = 0 \quad x_2 = -\frac{1}{4}$$

$$9) 2x^2 - 5 = 0$$

$$x^2 = \frac{5}{2}$$

$$x = \pm \sqrt{\frac{5}{2}}$$

$$10) 3x^2 + x + 2 < 0$$

$$\Delta = 1 - 4 \cdot 3 \cdot 2 = -23 < 0$$

$$\forall x \in \mathbb{R}: 3x^2 + x + 2 > 0$$

$\Rightarrow$  nerovnice nemá řešení

$$K = \emptyset$$

$$11) \frac{8}{x^2 + 4x + 1} \leq 0$$

$$x^2 + 4x + 1 = (x+2)^2 \quad \begin{array}{c} - - + - + + \\ \textcircled{-} \textcircled{-} \textcircled{+} \textcircled{-} \textcircled{+} \textcircled{+} \end{array}$$

$$= (x+2+\sqrt{3})(x+2-\sqrt{3})$$

$$x_1 = -2+\sqrt{3}$$

$$x_2 = -2-\sqrt{3}$$

$$\begin{array}{c} - - + - + + \\ \textcircled{-} \textcircled{-} \textcircled{+} \textcircled{-} \textcircled{+} \textcircled{+} \end{array}$$

$$x \in (-2-\sqrt{3}, -2+\sqrt{3})$$

$$\text{Soustava lin. rovnic}$$

$$\text{Řešte v } \mathbb{R}^2$$

$$\begin{cases} 7x - 3y = 15 \\ 5x + 6y = 27 \end{cases} \quad \left| \begin{array}{l} \textcircled{+} \\ \textcircled{-} \end{array} \right.$$

$$19x + 0 = 57$$

$$x = 3$$

$$15 + 6y = 27$$

$$y = 2$$

$$K = \{(3, 2)\}$$

$$x = 3, y = 2$$

$$\left. \begin{array}{l} x - 5y = 7 \\ x - 5y = 6 \end{array} \right\} \textcircled{+}$$

$$0 = 1 \quad \left| \begin{array}{l} \textcircled{-} \\ \textcircled{+} \end{array} \right. \quad \left. \begin{array}{l} 2 = 2 \\ 0 = 0 \end{array} \right.$$

$$\text{Soustava NR}$$

$$K = \emptyset$$

$$2x - 3y = 5 \quad | \cdot 2 \quad \left\{ \begin{array}{l} \textcircled{+} \\ \textcircled{-} \end{array} \right.$$

$$4x - 6y = 10 \quad \left\{ \begin{array}{l} \textcircled{+} \\ \textcircled{-} \end{array} \right.$$

$$0 = 0 \quad \left| \begin{array}{l} \textcircled{+} \\ \textcircled{-} \end{array} \right.$$

$\Rightarrow$  soustava má několik řešení

$$2x - 3y = 5$$

$$y = \frac{2}{3}x - \frac{5}{3}$$

$$K = \left\{ \left( x, \frac{2}{3}x - \frac{5}{3} \right) : x \in \mathbb{R} \right\}$$

## Rovnice s neznámou pod odmocninou

$$\text{Řešte v } \mathbb{R}$$

$$\sqrt{x} + x = 2 \quad |^2$$

$$x + 2\sqrt{x} + x^2 = 4$$

správně, ale knicem

$$x^2 + 2x + 4 = 0$$

$$(x+4)(x+1) = 0$$

$$x_1 = -4 \quad x_2 = -1$$

$$L \neq S$$

$$L = 2 \quad S = -2$$

$$x_1 = 2 \quad x_2 = -2$$

$$\sqrt{x} = 2 \quad \left| \begin{array}{l} \textcircled{-} \\ \textcircled{+} \end{array} \right.$$

$$x = 4 \quad \left| \begin{array}{l} \textcircled{-} \\ \textcircled{+} \end{array} \right.$$

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