

a)  $\frac{(x-3)}{(2-x)(2x-1)} \leq 0 \rightarrow \text{NB: } x-3 \Rightarrow x=3$   $2-x \neq 0 \Rightarrow x \neq 2$   $2x-1 \neq 0 \Rightarrow x \neq \frac{1}{2}$

Sign chart for  $\frac{(x-3)}{(2-x)(2x-1)} \leq 0$ :

Interval	Sign
$(-\infty, \frac{1}{2})$	+
$(\frac{1}{2}, 2)$	-
$(2, 3)$	+
$(3, \infty)$	-

$x \in (\frac{1}{2}, 2) \cup [3, \infty)$

b)  $\frac{(1-x)(3-x)}{(x^2-9)(x^2+3)} < 0 \mid (x^2+3) > 0$

$\frac{(1-x)(3-x)}{(x^2-9)} < 0$

$\frac{(1-x)(3-x)}{(x+3)(x-3)} < 0 \mid \cdot (-1) !!!$

$\frac{(1-x)(x-3)}{(x+3)(3-x)} > 0 \mid x \neq 3$

$\frac{1-x}{x+3} > 0 \rightarrow \text{NB: } 1-x \Rightarrow x=1$   $x+3 \neq 0 \Rightarrow x \neq -3$

Sign chart for  $\frac{(1-x)(x-3)}{(x+3)(3-x)} > 0$ :

Interval	Sign
$(-\infty, -3)$	-
$(-3, 1)$	+
$(1, 3)$	-
$(3, \infty)$	+

$x \in (-3, 1)$

c)  $\frac{2-3x}{2-x} + \frac{1}{x} > 3 \mid -3$

$\frac{x(2-3x) + (2-x) - 3x(2-x)}{x(2-x)} > 0$

$\frac{2x - 3x^2 + 2 - x - 6x + 6x^2}{x(2-x)} > 0$

$\frac{2x - 5x^2}{x(2-x)} > 0 \rightarrow \text{NB: } x = \frac{2}{5}; x \neq 0; x \neq 2$

Sign chart for  $\frac{2x - 5x^2}{x(2-x)} > 0$ :

Interval	Sign
$(-\infty, 0)$	-
$(0, \frac{2}{5})$	+
$(\frac{2}{5}, 2)$	-
$(2, \infty)$	+

$x \in (0, \frac{2}{5}) \cup (2, \infty)$

d)  $\frac{(2x-1)(3-x)}{2x+2} < 0$

Sign chart for  $\frac{(2x-1)(3-x)}{2x+2} < 0$ :

Interval	Sign
$(-\infty, -1)$	+
$(-1, \frac{1}{2})$	-
$(\frac{1}{2}, 3)$	+
$(3, \infty)$	-

$x \in (-1, \frac{1}{2}) \cup (3, \infty)$

e)  $x \geq \frac{6}{5-x} \mid x \in (2; 3) \cup (5; \infty)$

$\frac{x(5-x) - 6}{5-x} \geq 0$

f)  $\frac{3}{x-2} + \frac{2}{x+1} \geq 0; x \in (-1; \frac{1}{5}) \cup (2; \infty)$

$\frac{3(x+1) + 2(x-2)}{(x-2)(x+1)} \geq 0$

- otestuj sa: <https://www.skolasnadhledem.cz/game/953>
- na pomoc:
  - <https://www.youtube.com/watch?v=cxHTdlir89Y>
  - <https://www.youtube.com/watch?v=bfh8EUrJSu8>
- na precvičenie

### Rovnice, nerovnice v súčinnom a podielovom tvare

1. Riešte v R

$$\text{a) } (x-1)(2x-3)(x+2)=0 \qquad \text{b) } (x^2-3x)(x-\sqrt{5})=0 \qquad \text{c) } (4x^2-1)(1-5x)=0$$

2. Riešte v R

$$\begin{array}{lll} \text{a) } (x-2)(4x-1)(2x+6)>0 & \text{b) } (x^2-x)(3-x)\leq 0 & \text{c) } (x^2-16)(4-3x)\geq 0 \\ \text{d) } (x^2-16)(3-x^2)\leq 0 & \text{e) } (x^2+2)(2-x)>0 & \text{f) } (3x^3-6x^2)(x+10)>0 \\ \text{g) } (3x^3-6x^2)(x+10)\geq 0 & & \end{array}$$

3. Riešte v R

$$\begin{array}{lll} \text{a) } \frac{x-4}{2x-5}>0 & \text{b) } \frac{x+3}{1-x}>2 & \text{c) } \frac{x+2}{x^2-25}\leq 0 \\ \text{d) } \frac{9-4x^2}{x^2+x}\geq 0 & \text{e) } \frac{x-4}{x+2}+\frac{x+1}{3-x}>0 & \text{f) } \frac{x^2-4}{x^2-25}\geq 1 \end{array}$$

### Výsledky

1. a)  $-2; 1; 3/2$  b)  $0; 3; \sqrt{5}$  c)  $\pm 1/2; 1/5$

2. a)  $(-3; 1/4) \cup (2; \infty)$  b)  $\langle 0; 1 \rangle \cup \langle 3; \infty)$  c)  $(-\infty; -4 \rangle \cup \langle 3/4; 4 \rangle$  d)  $(-\infty; -4 \rangle \cup \langle -\sqrt{3}; \sqrt{3} \rangle \cup \langle 4; \infty)$

e)  $(-\infty; 2)$  f)  $(-\infty; -10) \cup (2; \infty)$  g)  $(-\infty; -10) \cup (2; \infty) \cup \{0\}$

3. a)  $(-\infty; 5/2) \cup (4; \infty)$  b)  $(-1/4; 1)$  c)  $(-\infty; -5) \cup \langle -2; 5)$  d)  $\langle -3/2; -1 \rangle \cup (0; 3/2 \rangle$

e)  $(-\infty; -2) \cup (1; 3)$  f)  $(-\infty; -5) \cup (5; \infty)$