Absolutní hodnota

$$y = |x| \begin{cases} -x, & x < 0 \\ x, & x \geq 0 \end{cases}$$

$f(x)$:

$|f(x)|$

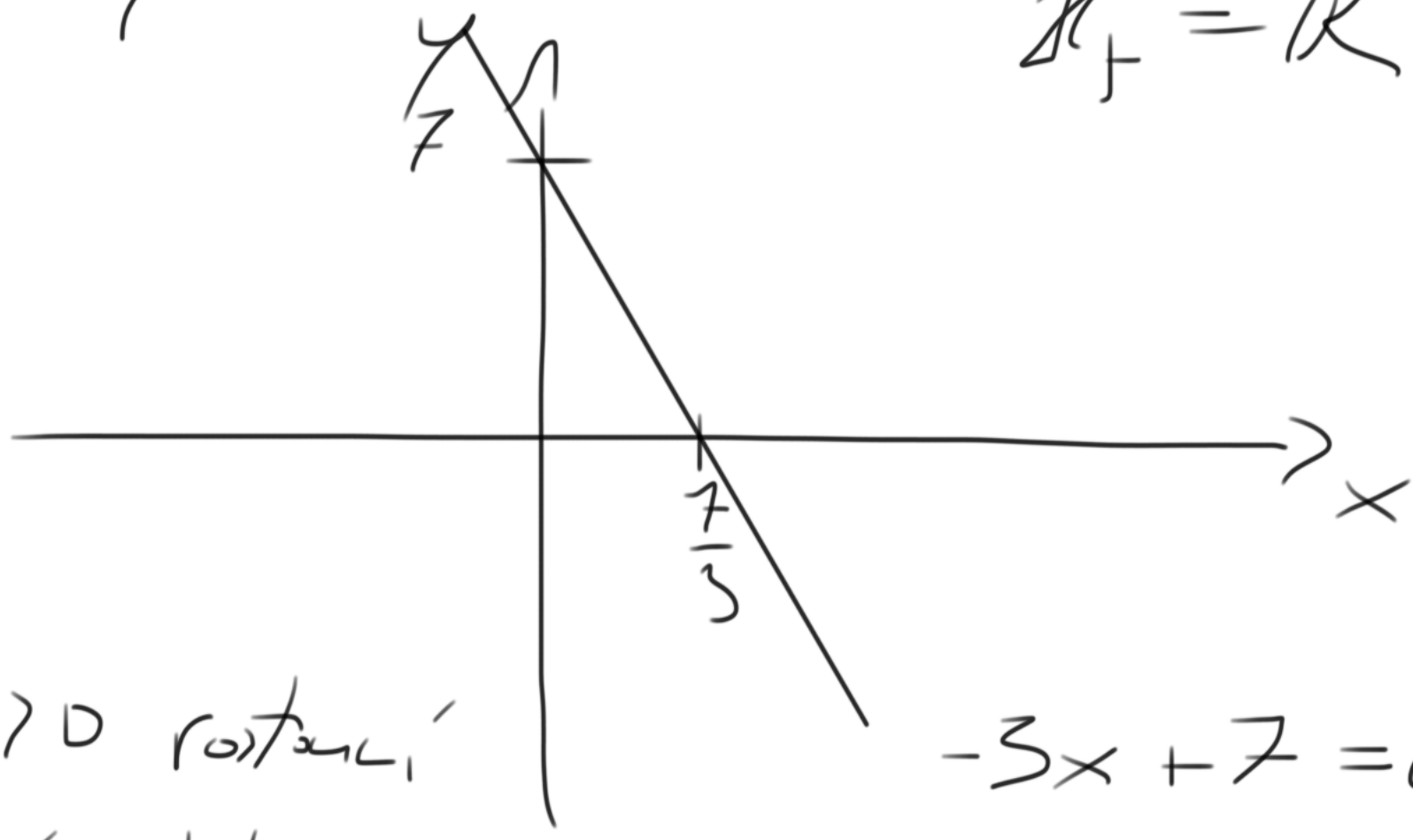
Zadání: graf, určit D_f, H_f, významné body

Vlastnosti: monotonie, periodicita (p), omezenost, parita, prostá?

1) $y = -3x + 7$

$D_f = \mathbb{R}$

$H_f = \mathbb{R}$



$a > 0$ rostoucí

$a < 0$ klesající

$-3x + 7 = 0$

$x = \frac{7}{3}$

$a = -3$

klesající, nerostoucí, prostá, není při.

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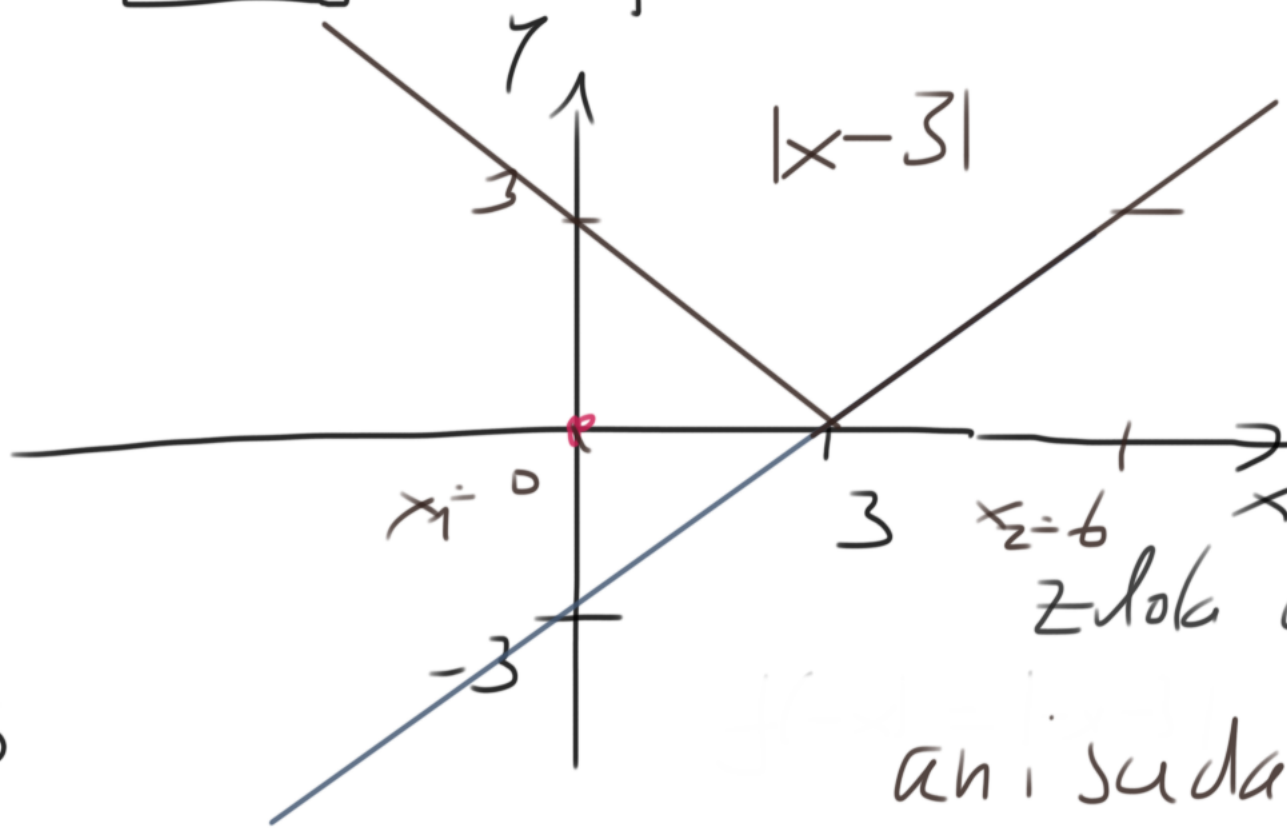
2) $y = |x-3|$ $D_f = \mathbb{R}$

$H_f = \mathbb{R}_0^+$



$y = x - 3$

$x - 3 = 0$

$x = 3$

klesá v $(-\infty, 3)$

roste v $(3, \infty)$

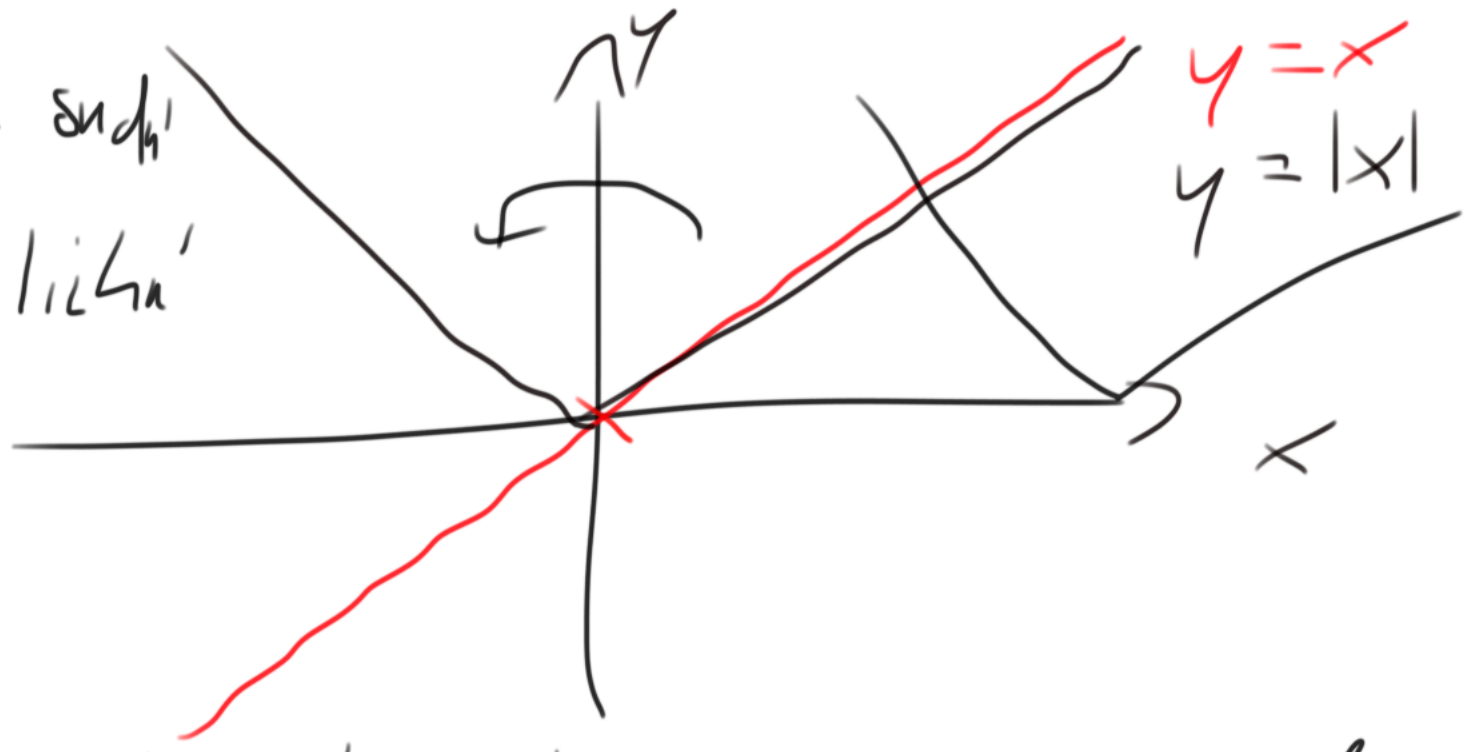
není prostá

zdola omezená 0

ani sudá, ani lichá

$y = |x|$. sudá

g: $y = x$ lichá



$f(-x) = |-x| = |x| = f(x)$ sudá

$g(-x) = -x = -f(x)$ lichá

$y = |x-6| + |x|$ $D_f = \mathbb{R}$ $H_f = \langle 6, \infty)$

I $y = -x+6-x$ 0

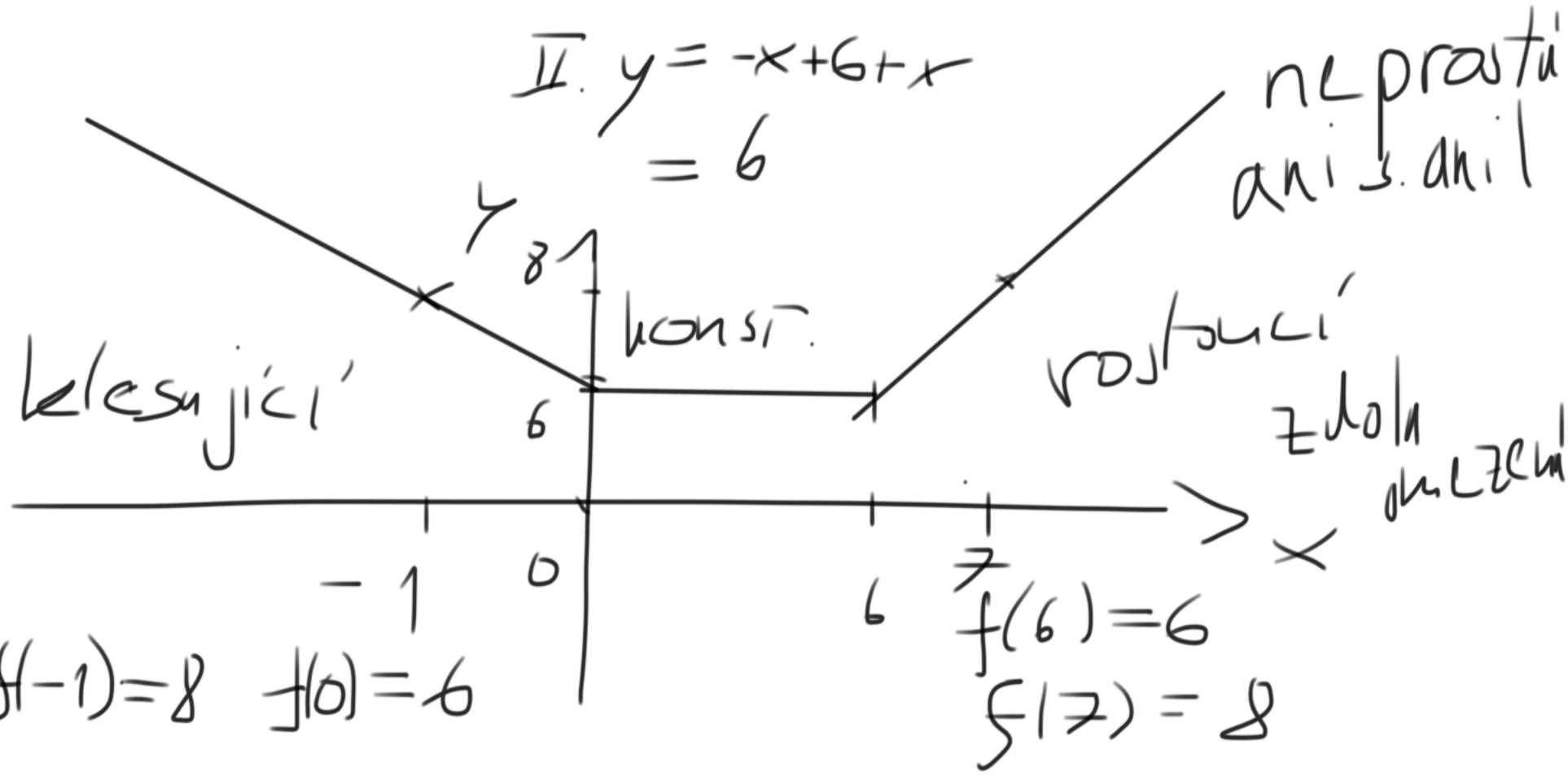
$= -2x+6$

$y = x-6+x$

$= 2x-6$

II. $y = -x+6+x$

$= 6$



$f(-1) = 8$ $f(0) = 6$

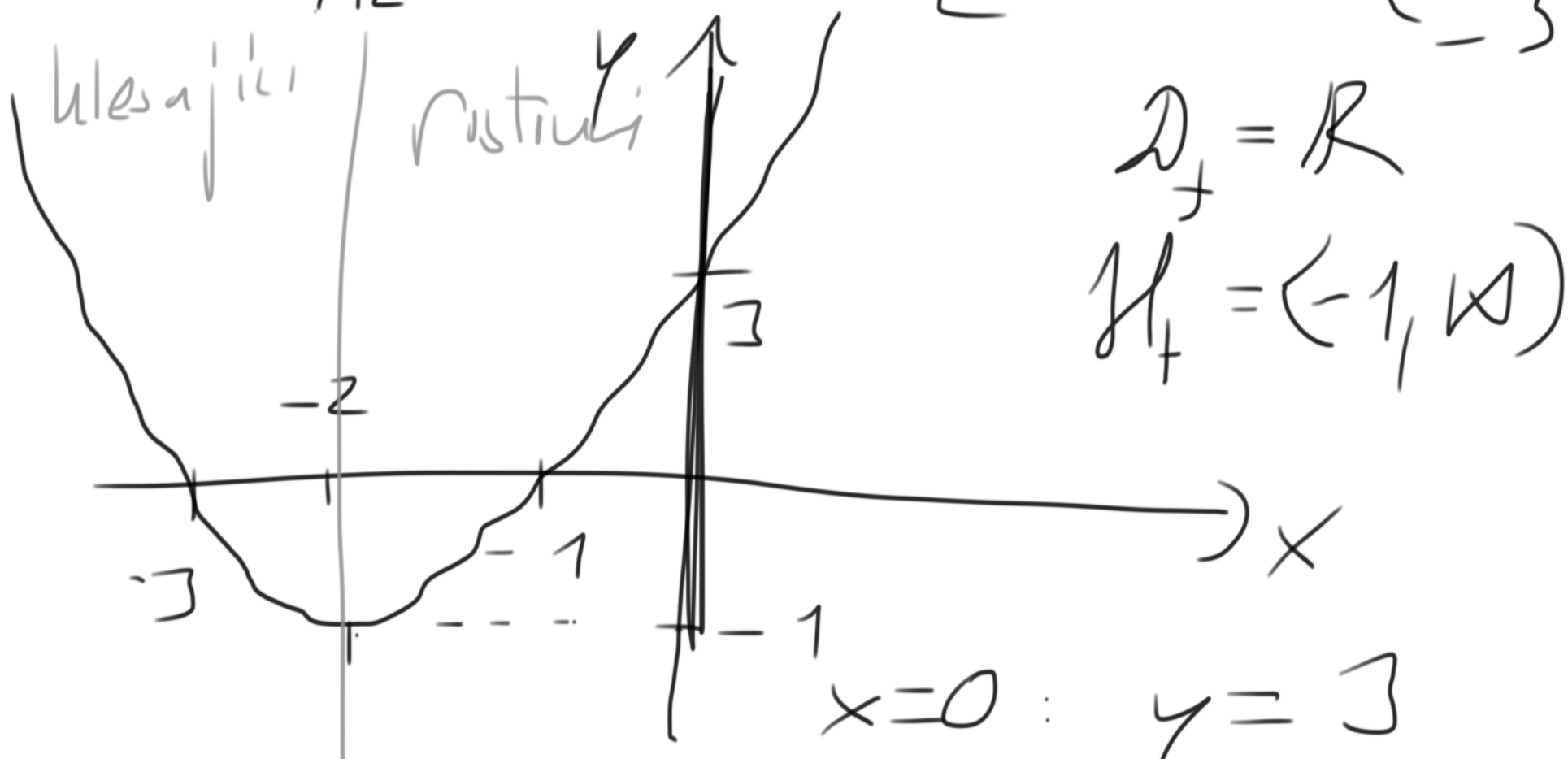
$f(6) = 6$

$f(7) = 8$

5) $y = x^2 + 4x + 3$ $\quad a = 1 > 0$

$0 = x^2 + 4x + 3$ $\quad a < 0$

$x_{1,2} = \frac{-4 \pm \sqrt{16 - 4 \cdot 3}}{2} = \begin{cases} -1 \\ -3 \end{cases}$



$D_f = \mathbb{R}$

$H_f = (-1, \infty)$

$x = 0 : \quad y = 3$

$V\left[-\frac{b}{2a} \mid c - \frac{b^2}{4a}\right]$

$= \left[-2, 3 - \frac{16}{4}\right] = [-2, -1]$

$V_x = -2$

$V_y = f(V_x)$

$V_y = -1$

$y = x^{2n}$ sudá

$y = x^2 + 4x + 3$

$f(-x) = (-x)^2 + 4(-x) + 3$

$= x^2 - 4x + 3 \neq -f(x)$

nemá sudí

6) $y = x^2 - 6x + 9$

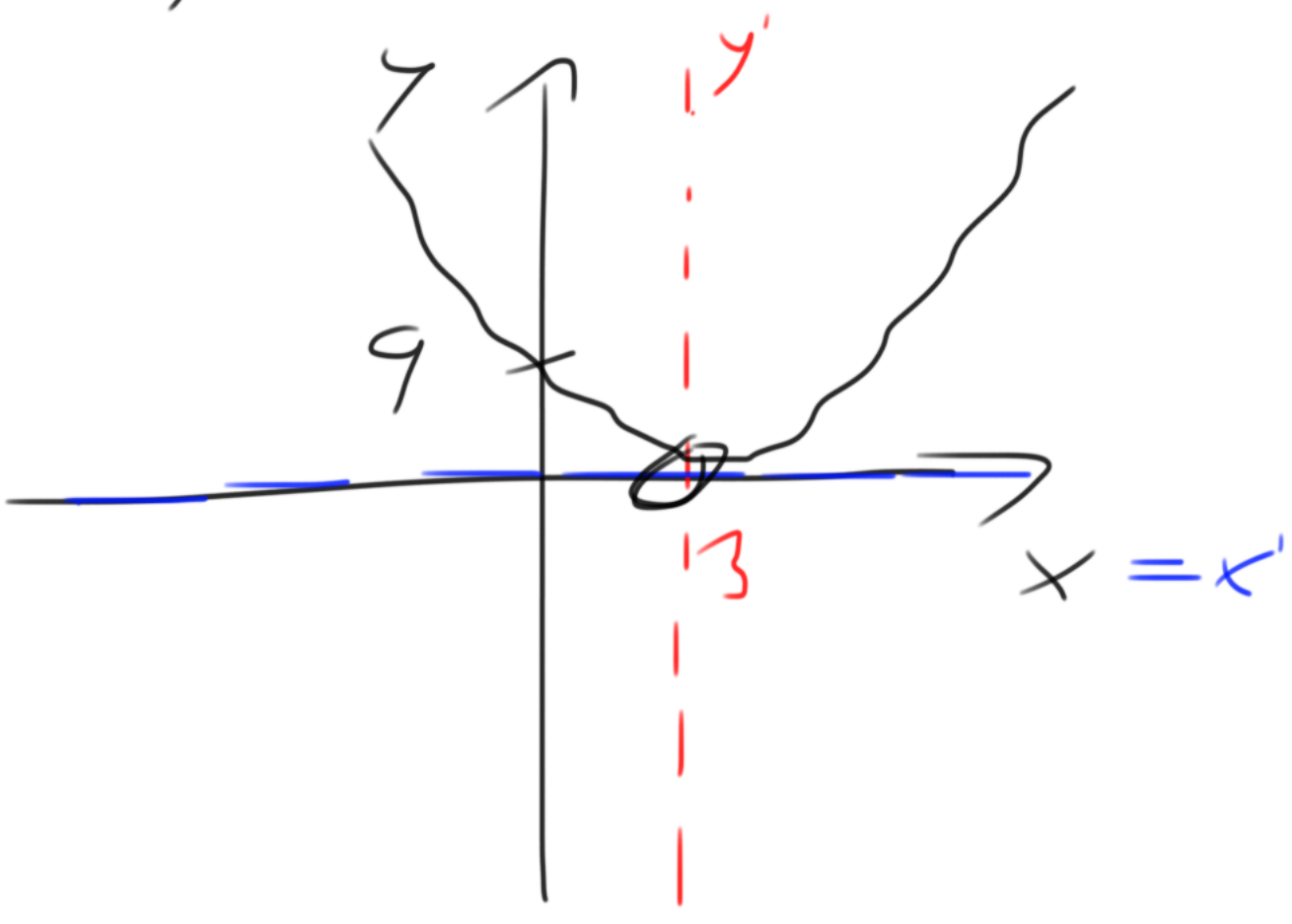
$= (x-3)^2 + 9 - 9 = (x-3)^2 + 0$

$y = a(x-B)^2 + C$

$a = 1$

$B = 3$

$C = 0$



$y' = x'^2$

! vzhledem k novým osám

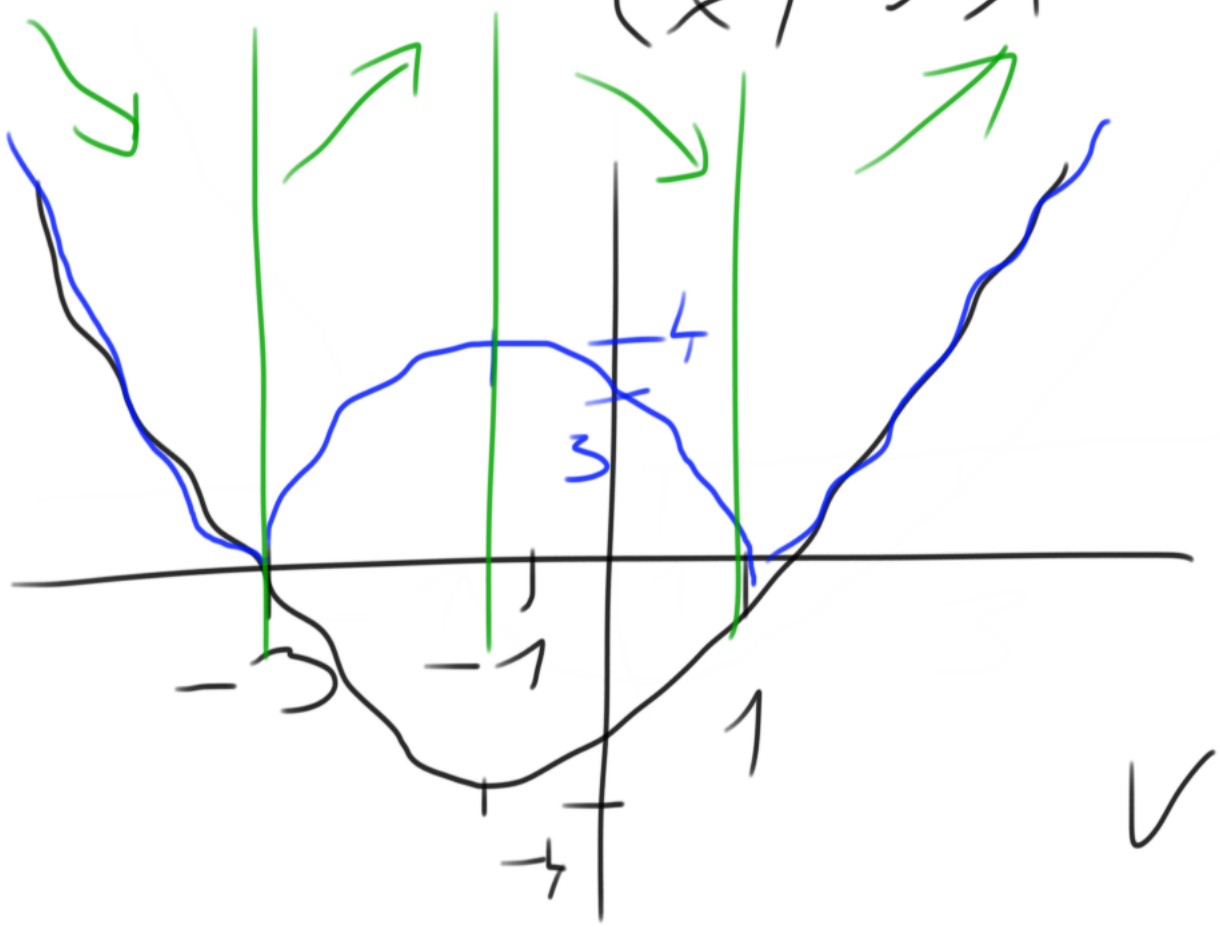
14) $y = |x^2 + 2x - 3|$

$y = x^2 + 2x - 3$

$0 = x^2 + 2x - 3$

$a = 1 \cup$

$= (x+3)(x-1)$



$V_y = f(V_x)$

$V_y = f(-1)$

$= -4$

$V[-1, -4]$

$V[-1, 4]$

$x = 0 \quad f(x) = |-3| = 3$

14) $y = \frac{2}{x+3}$

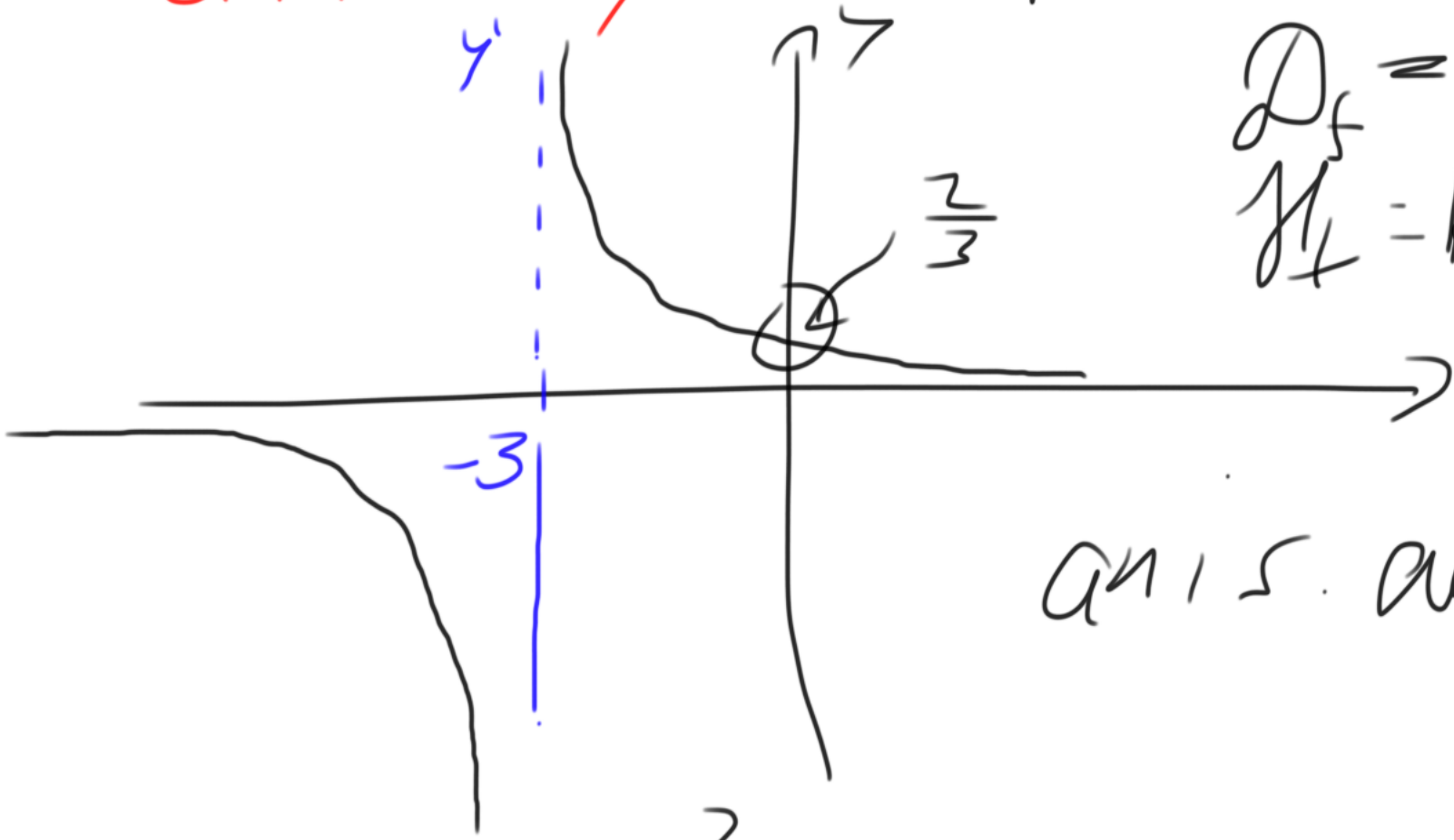
$\frac{1}{x}$ 

$y = 2 \cdot \frac{1}{x+3} + 0$

kontrakce dilatace v y

posun v x

posun v y nic!



$D_f = \mathbb{R} \setminus \{-3\}$

$H_f = \mathbb{R} \setminus \{0\}$

ani s. ani l.

$x = 0 : \quad y = \frac{2}{0+3} = \frac{2}{3}$

$y \overset{?}{=} 0 \qquad \frac{2}{x+3} = 0 \;/\cdot(x+3) \qquad \underset{NR}{2 = 0}$

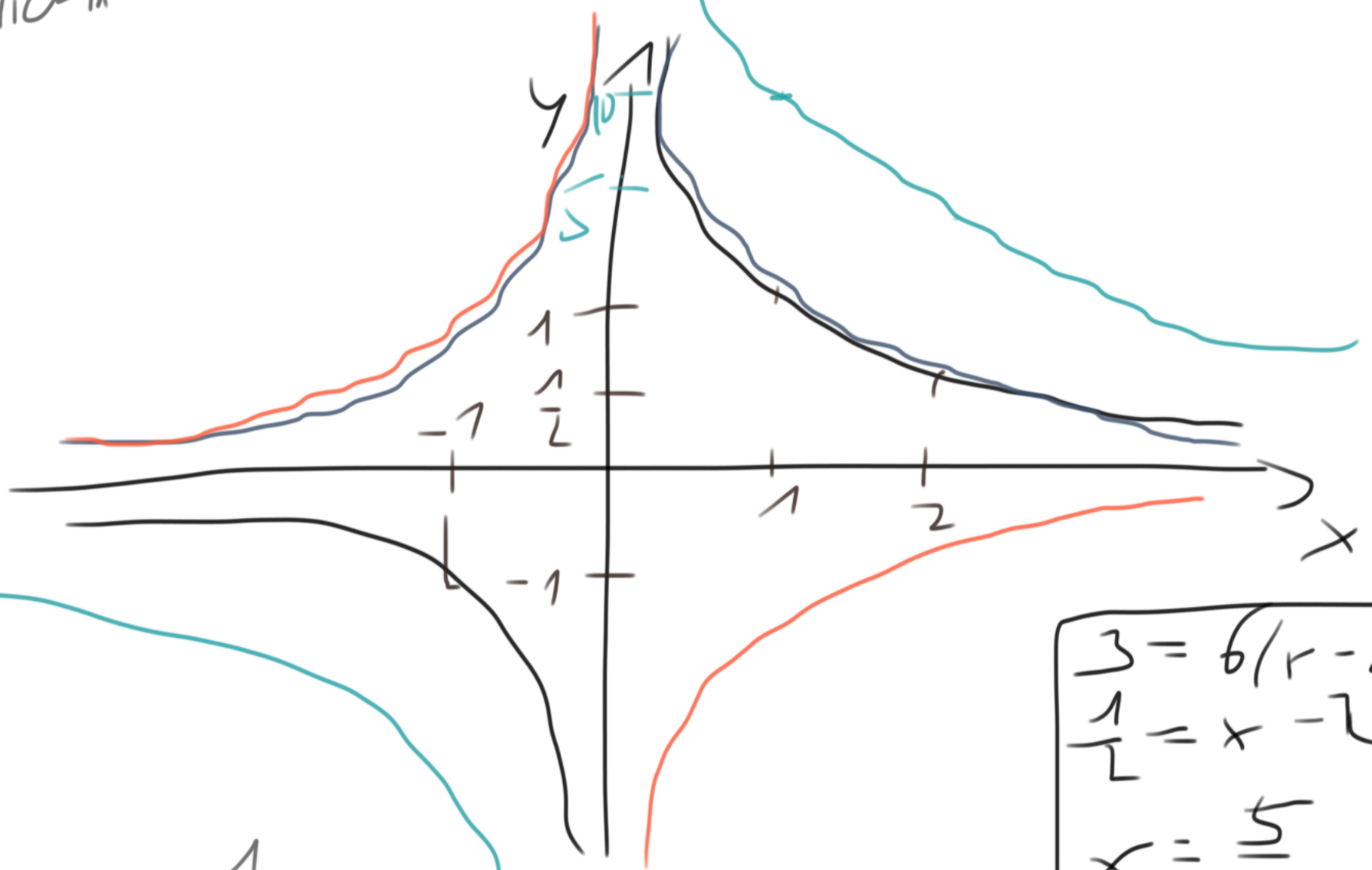
$y = \frac{1}{x}$

lichá

$y = \left|\frac{1}{x}\right|$

$y = -\frac{1}{x}$

$y = \frac{10}{x}$



$3 = 6(x-2)$

$\frac{1}{2} = x - 2$

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

$f(-x) = \frac{1}{-x} = -\frac{1}{x} = -f(x)$ ✓

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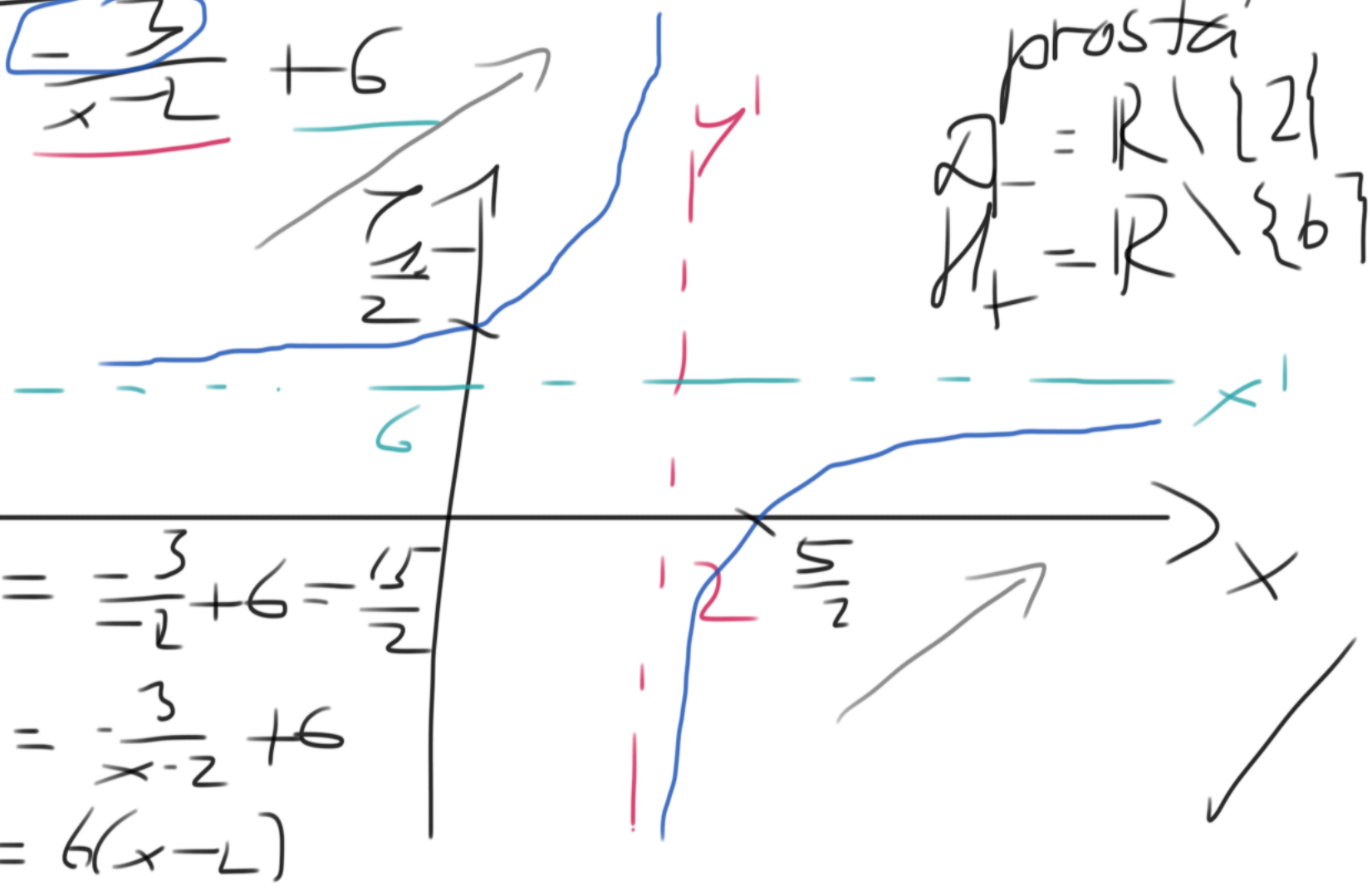
20) $y = \frac{-3}{x-2} + 6$



prostá

$D = \mathbb{R} \setminus \{2\}$

$H = \mathbb{R} \setminus \{6\}$

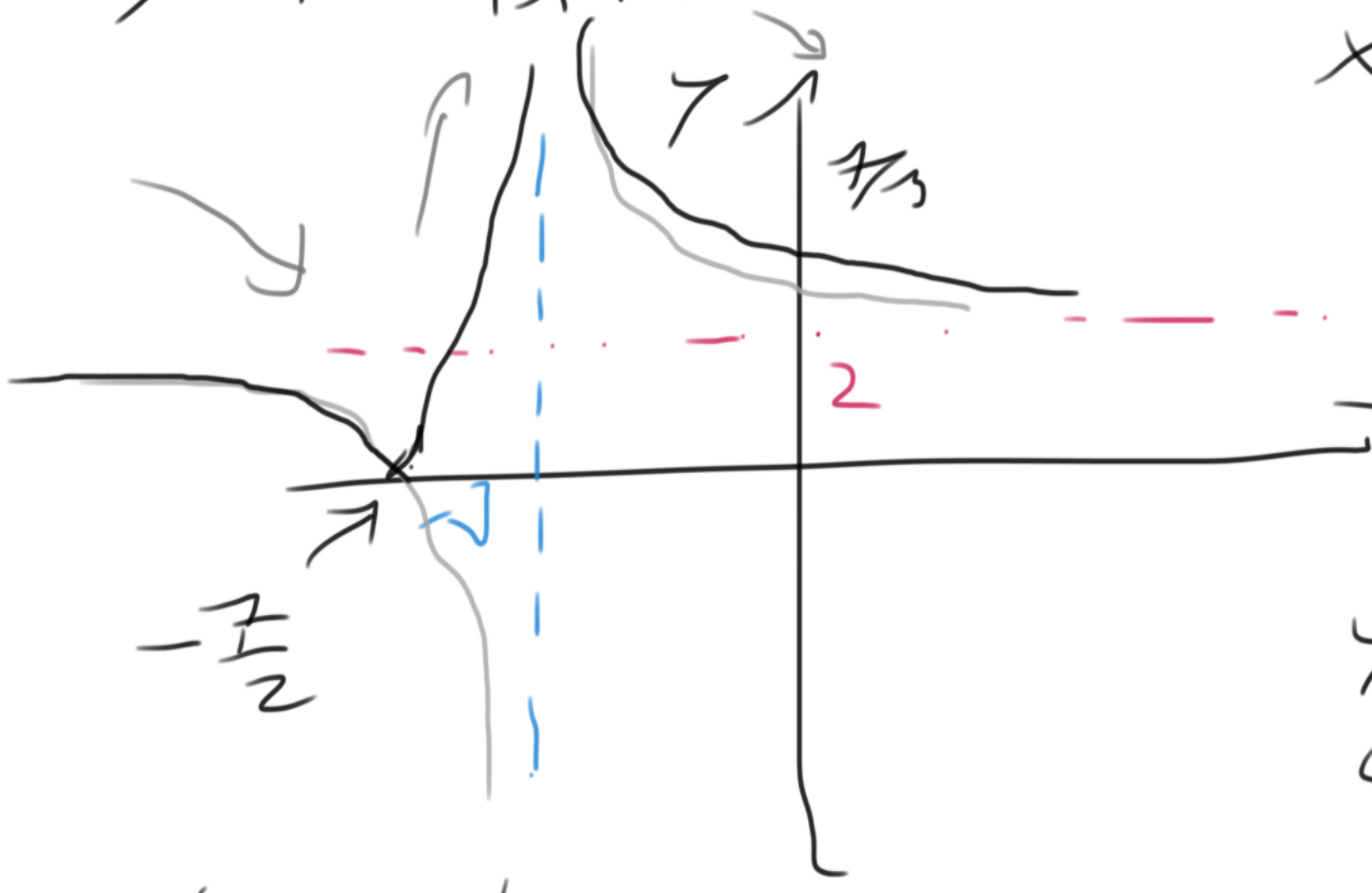
$x = 0 \quad y = \frac{-3}{-2} + 6 = \frac{15}{2}$

$y = 0 \quad 0 = \frac{-3}{x-2} + 6$

$3 = 6(x-2)$

✓

23) $y = \left|\frac{1}{x+3} + 2\right|$



$x = 0$

$y = \frac{1}{3} + 2$

$= \frac{7}{3}$

$y = 0$

$0 = \frac{1}{x+3} + 2$

$-2(x+3) = 1$

$x = -\frac{1}{2} - 3$

$x = -\frac{7}{2}$

není prostá

zdola omezená

klesající $\vee \left(-\infty, -\frac{7}{2}\right) \cup (-3, \infty)$

rostoucí $\vee \left(-\frac{7}{2}, -3\right)$

$y = x^2 + 4x + 1$

$D_f = \langle -3, 5 \rangle$

omezená

$D_f = \langle -1, 5 \rangle$

rostoucí na D_f

$\Rightarrow$ rostoucí