

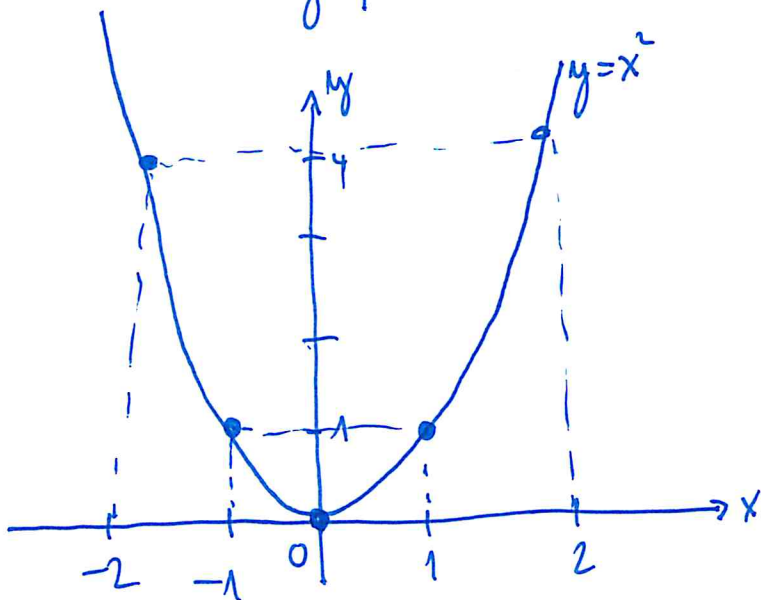
# KVADRATICKÉ FUNKCE, KV. ROVNICE

$$f: y = x^2$$

x	-2	-1	0	1	2	3
y	4	1	0	1	4	9



x	4	1	0	1	4	9
y	-2	-1	0	1	2	3



$$4 \begin{matrix} \nearrow -2 \\ \searrow 2 \end{matrix}$$

grafem je parabola

$$D_f = \mathbb{R}$$

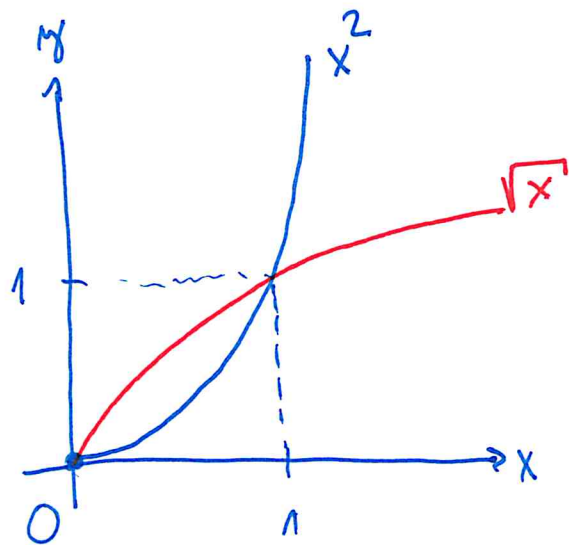
$$H_f = \langle 0, +\infty \rangle$$

$$f: y = x^2, Df = \langle 0, +\infty \rangle$$

$$g: y = \sqrt{x}$$

x	0	1	2	3
y	0	1	4	9

x	0	1	4	9
y	0	1	2	3



$$Hf = \langle 0, +\infty \rangle$$

$$Hg = Df = \langle 0, +\infty \rangle$$

$$Dg = Hf = \langle 0, +\infty \rangle$$

$$\sqrt{9} = 3$$

~~$$\sqrt{9} = -3$$~~ porque  $(-3)^2 = 9$

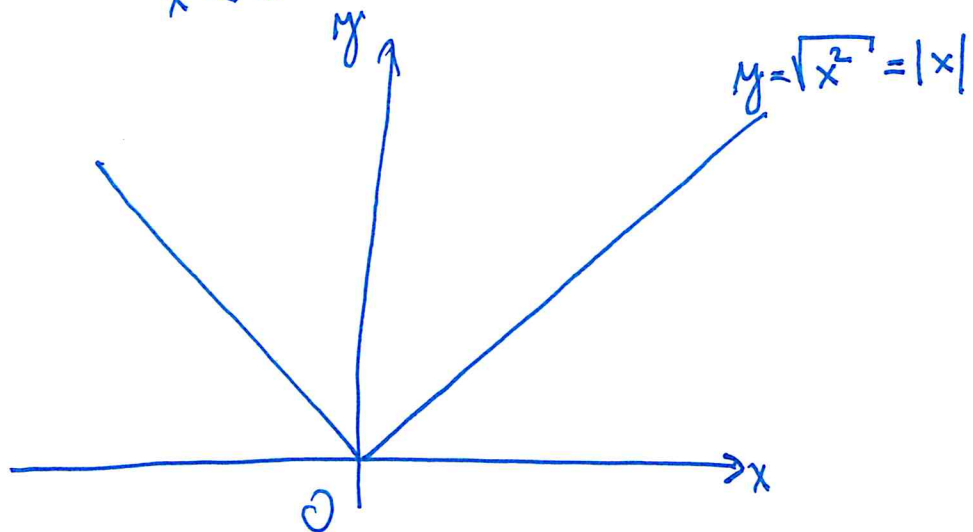
$$h: y = \sqrt{x^2} = |x|$$

$$Dh = \mathbb{R}$$

je absolutní hodnota

x	-2	-1	0	1	2
y = $\sqrt{x^2}$	2	1	0	1	2

pro  $x \geq 0$   $\sqrt{x^2} = x$   
 $x < 0$   $\sqrt{x^2} = -x$



$$x^2 = 4 \quad / \sqrt{\quad}$$

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

$$|x| = 2$$

$$x_1 = 2 \quad \checkmark$$

$$x_2 = -2$$

# KVADRATICKÁ ROVNICE

$$\underline{x^2 + 2x - 8 = 0}$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(x+1)^2 = \underline{x^2 + 2x + 1}$$

$$x^2 + 2x - 8 = x^2 + 2x + 1 - 9 = (x+1)^2 - 9$$

$$x^2 + 2x - 8 = 0$$

$$(x+1)^2 - 9 = 0 \quad / +9$$

$$(x+1)^2 = 9 \quad / \sqrt{\quad}$$

$$\sqrt{(x+1)^2} = 3$$

$$|x+1| = 3$$

pro  $x+1 \geq 0$  je  $|x+1| = x+1 \rightarrow x+1 = 3$

$$\boxed{x_1 = 2}$$

pro  $x+1 < 0$  je  $|x+1| = -(x+1) \rightarrow -(x+1) = 3$

$$x+1 = -3$$

$$\boxed{x_2 = -4}$$

VZOREC:  $ax^2 + bx + c = 0, a \neq 0$

$$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$D = b^2 - 4ac$  Diskriminant

$D < 0$  rovnice nemá řešení ( $\in \mathbb{R}$ )

$D = 0$  rovnice má jedno řešení

$D > 0$  rovnice má 2 řešení

$$x^2 + 2x - 8 = 0$$

$$x_{1,2} = \frac{-2 \pm \sqrt{4 + 32}}{2} = \frac{-2 \pm 6}{2} \begin{cases} = 2 \\ = -4 \end{cases}$$

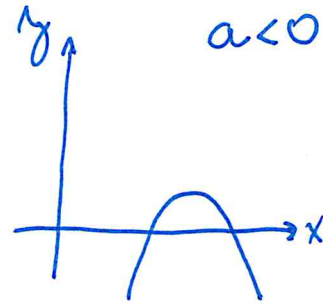
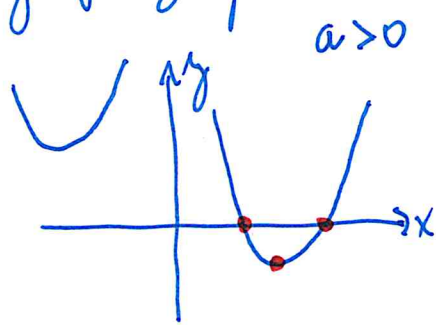
ZKOUŠKA!

$$(x-2)(x+4) = 0$$

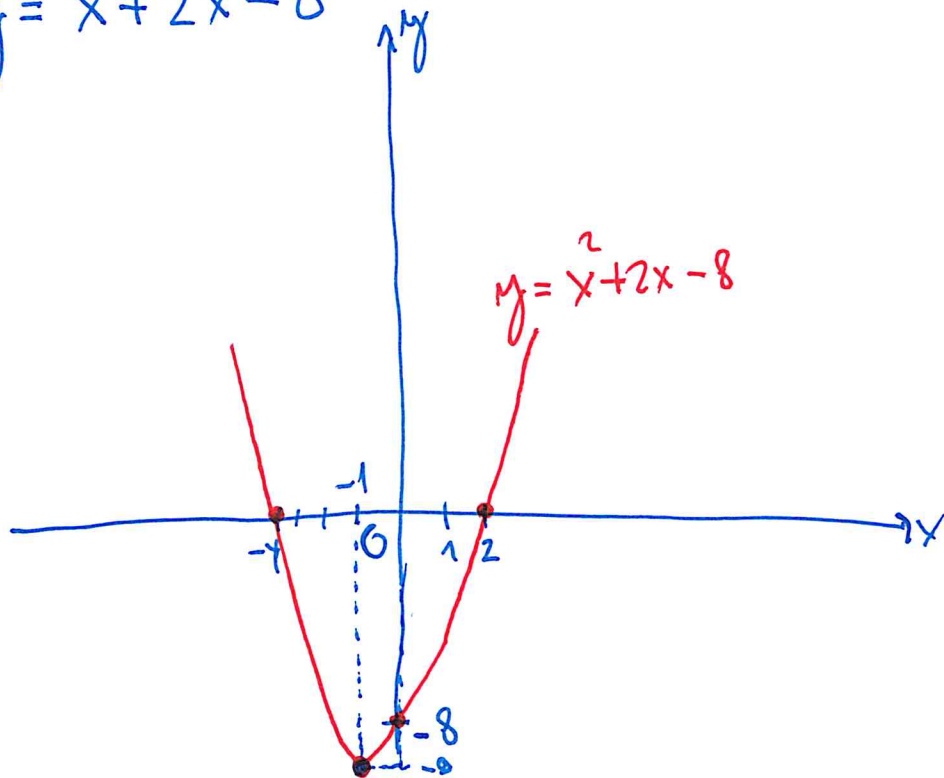
$$x^2 + 2x - 8 = (x-2)(x+4)$$

KVADRATICKÁ FUNKCE:  $y = ax^2 + bx + c$ ,  $a, b, c \in \mathbb{R}$ ,  $a \neq 0$

grafem je parabola  $\rightarrow$  nestočí tabulka



$$y = x^2 + 2x - 8$$



průsečík s y:  $x = 0$   
 $y = -8$

průsečík s x:  $y = 0$   
 $x^2 + 2x - 8 = 0$

$$x_1 = 2$$

$$x_2 = -4$$

$$y = x^2 + 4x + 5$$

průsečík s  $y$ :  $x=0$   $y=5$

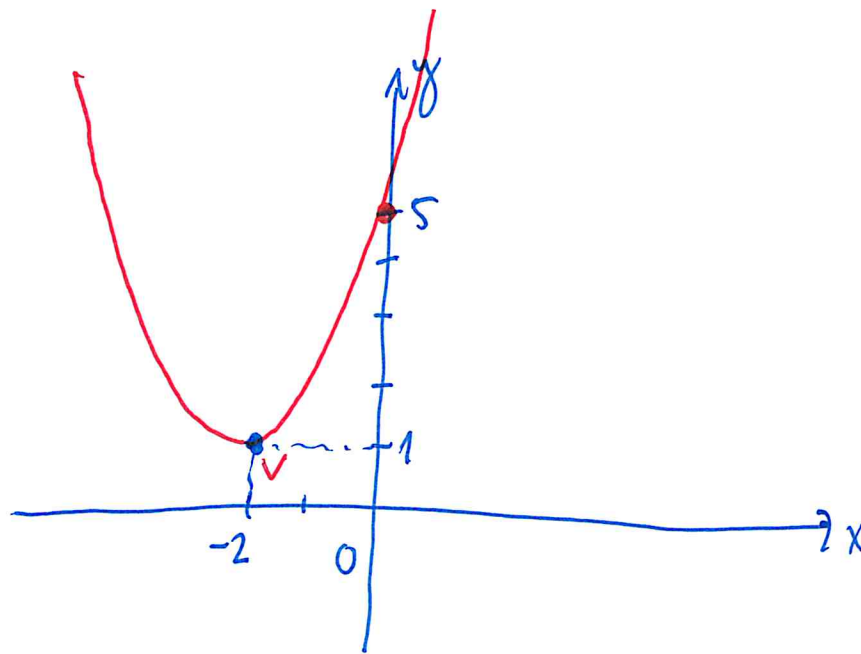
průsečík s  $x$ :  $y=0$

$$x^2 + 4x + 5 = 0$$

$$D = 16 - 20 = -4 < 0$$

rovnice nemá řešení

↓  
parabola nemá průsečík s  $x$



$$y = (x+2)^2 + 1$$

hledáme vrchol pomocí derivace

$$y' = 2x + 4 = 0$$

$$2x = -4$$

$$\underline{x_v = -2} \rightarrow y_v = 1$$