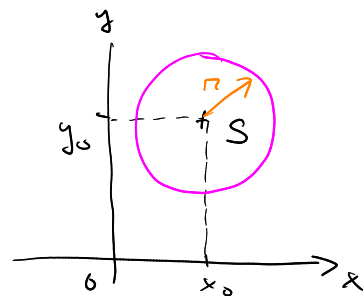


KUŽELOSEČKY



Ⓐ KRUŽNICE

$$(x-x_0)^2 + (y-y_0)^2 = r^2$$

$S = [x_0, y_0]$... STŘED, r ... POLOMĚR

Ⓑ ELIPSA

$$\frac{(x-x_0)^2}{a^2} + \frac{(y-y_0)^2}{b^2} = 1$$

$S = [x_0, y_0]$... STŘED

a, b ... POLOOSY

e ... EXCENTRICITA [$a^2 = b^2 + e^2$]

$a > b$

$a < b$

Ⓒ HYPERBOLA

$$\pm \frac{(x-x_0)^2}{a^2} - \frac{(y-y_0)^2}{b^2} = 1 \quad) (\quad \cup \quad \cap$$

$S = [x_0, y_0]$... STŘED, a, b ... POLOOSY, e ... EXCENTRICITA [$e^2 = a^2 + b^2$]

Ⓓ PARABOLA

$$(y-y_0)^2 = \pm 2p(x-x_0)$$

$\cup \quad \cap$

$$(x-x_0)^2 = \pm 2p(y-y_0)$$

$\cup \quad \cap$

$V = [x_0, y_0]$... VRCHOL

p ... PARAMETR - VZDÁLENOST OHNISKA OD ŘÍDÍCÍ PŘÍMKY.

$$Ax^2 + Bx + Cy^2 + Dy + E = 0$$

$$A = C$$

\Rightarrow KRUŽNICE

$$A \neq C, A, C \text{ - STEJNÁ ZNAMÉNKA}$$

\Rightarrow ELIPSA

$$A, C \text{ - OPAČNÁ ZNAMÉNKA}$$

\Rightarrow HYPERBOLA

$$A = 0 \text{ NEBO } C = 0$$

\Rightarrow PARABOLA

PŘÍKLAD 0.2. $B = \{ [x, y] \in E_2; x^2 - y^2 + 2x - 6y + 1 > 0, 64x^2 + 25y^2 - 1600 < 0 \}$

$$x^2 - y^2 + 2x - 6y + 1 > 0$$

$$(x-1)^2 + (y-3)^2 > 3^2$$

$$x^2 + 2x + y^2 - 6y + 1 > 0$$

$$\Rightarrow \text{KRUŽNICE } S = [-1, 3]$$

$$(x+1)^2 - 1 + (y-3)^2 - 9 + 1 > 0$$

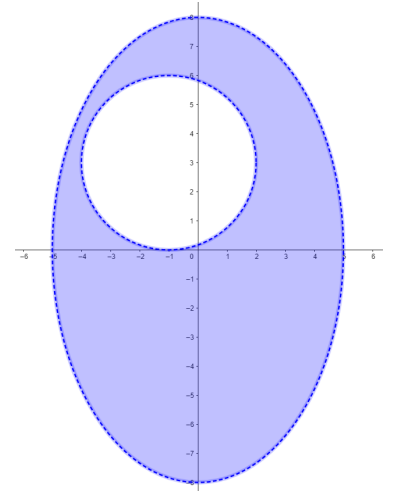
$$r = 3$$

$$64x^2 + 25y^2 - 1600 < 0$$

$$64x^2 + 25y^2 < 1600 \quad /:160$$

$$\frac{x^2}{25} + \frac{y^2}{64} < 1$$

\Rightarrow ELIPSA $S=[0,0], a=5, b=8$



PŘÍKLAD 0.6. $F = \{[x,y] \in \mathbb{E}_2; 36x - 9y^2 - 12y - 58 = 0\}$

$$36x - 9y^2 - 12y - 58 = 0$$

$$9y^2 - 12y = 36x - 58$$

$$9\left(y^2 + \frac{4}{3}y\right) = 36x - 58$$

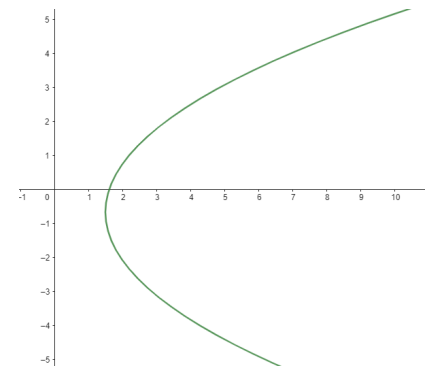
$$9\left(y + \frac{2}{3}\right)^2 - 4 = 36x - 58$$

$$9\left(y + \frac{2}{3}\right)^2 = 36x - 54 \quad /:\frac{1}{9}$$

$$\left(y + \frac{2}{3}\right)^2 = 4x - 6$$

$$\left(y + \frac{2}{3}\right)^2 = 4\left(x - \frac{3}{2}\right)$$

\Rightarrow PARABOLA $V = \left[\frac{3}{2}, -\frac{2}{3}\right]$
 $p=2$



PŘÍKLAD 0.9. $K = \{[x,y] \in \mathbb{E}_2; 9x^2 - 4y^2 - 18x - 16y - 43 = 0\}$

$$9x^2 - 4y^2 - 18x - 16y - 43 = 0$$

$$9x^2 - 18x - 4y^2 - 16y - 43 = 0$$

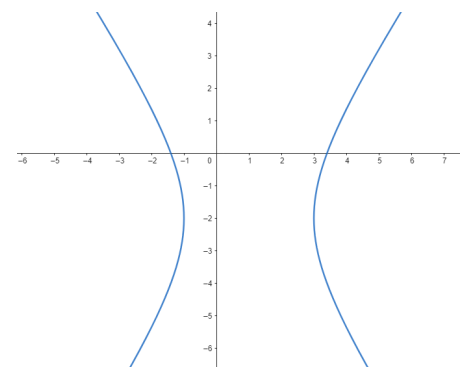
$$9(x^2 - 2x) - 4(y^2 + 4y) - 43 = 0$$

$$9(x-1)^2 - 9 - 4(y+2)^2 + 16 - 43 = 0$$

$$9(x-1)^2 - 4(y+2)^2 = 36 \quad /:\frac{1}{36}$$

$$\frac{(x-1)^2}{4} - \frac{(y+2)^2}{9} = 1$$

\Rightarrow HYPERBOLA $S=[1,-2]$
 $a=2, b=3$

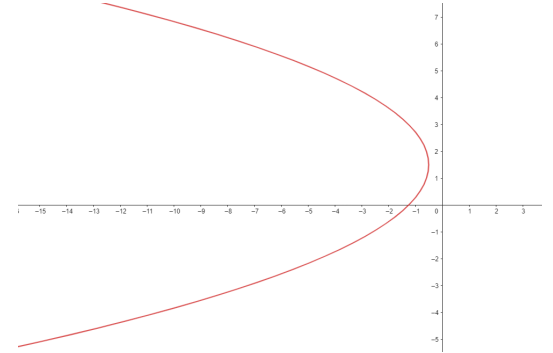


PŘÍKLAD 0.7. $G = \{[x, y] \in \mathbb{E}_2; -4y^2 + 12y - 12x - 15 = 0\}$

$$\begin{aligned} -4y^2 + 12y - 12x - 15 &= 0 \\ 4y^2 - 12y &= -12x - 15 \\ 4(y^2 - 3y) &= -12x - 15 \\ 4\left(y - \frac{3}{2}\right)^2 - 9 &= -12x - 15 \\ 4\left(y - \frac{3}{2}\right)^2 &= -12x - 6 \\ \left(y - \frac{3}{2}\right)^2 &= -3x - \frac{3}{2} \\ \left(y - \frac{3}{2}\right)^2 &= -3\left(x + \frac{1}{2}\right) \end{aligned}$$

\Rightarrow PARABOLA $V = \left[-\frac{1}{2}, \frac{3}{2}\right]$

$$p = \frac{3}{2}$$

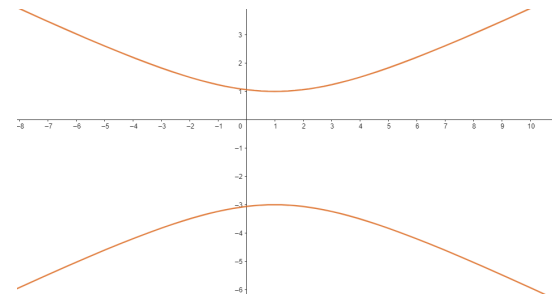


PŘÍKLAD 0.10. $L = \{[x, y] \in \mathbb{E}_2; 16y^2 - 4x^2 + 32y + 8x - 52 = 0\}$

$$\begin{aligned} 16y^2 - 4x^2 + 32y + 8x - 52 &= 0 \\ -4x^2 + 8x + 16y^2 + 32y - 52 &= 0 \\ -4(x^2 - 2x) + 16(y^2 + 2y) - 52 &= 0 \\ -4(x-1)^2 + 4 + 16(y+1)^2 - 16 - 52 &= 0 \\ -4(x-1)^2 + 16(y+1)^2 &= 64 \quad | \cdot \frac{1}{64} \\ -\frac{(x-1)^2}{16} + \frac{(y+1)^2}{4} &= 1 \end{aligned}$$

\Rightarrow HYPERBOLA $S = [1, -1]$

$$a = 4, b = 2$$



ABSOLUTNÍ HODNOTA

• NEZÁPORNÉ REÁLNÉ ČÍSLO $|a|$, PRO KTERÉ PLATÍ:

1) $\forall \in \mathbb{R} \quad a \geq 0 \rightarrow |a| = a$

2) $\forall \in \mathbb{R} \quad a < 0 \rightarrow |a| = -a$

PLATÍ: $|a \cdot b| = |a| \cdot |b|$

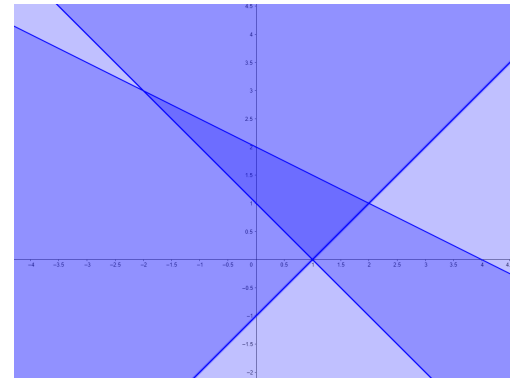
$$\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$$

$$|a+b| \leq |a| + |b|$$

$$\begin{aligned}
 x \in (-d, d) & \Leftrightarrow |x| < d \\
 x \in (-\infty, -d) \cup (d, \infty) & \Leftrightarrow |x| > d \\
 x \in (c-d, c+d) & \Leftrightarrow |x-c| < d \text{ „VZDÁLENOST ČÍSLA } x \text{ OD } c \text{ JE MENŠÍ NEŽ } d \text{“}
 \end{aligned}$$

PŘÍKLAD 0.3. $C = \{[x, y] \in \mathbb{E}_2; |1-x| \leq y \leq -\frac{1}{2}x+2\}$

$$\begin{aligned}
 |1-x| \leq y & \quad \wedge \quad y \leq -\frac{1}{2}x+2 \\
 -y \leq 1-x \leq y \\
 y \geq x-1 \quad \wedge \quad y \geq 1-x \quad \wedge \quad y \leq -\frac{1}{2}x+2
 \end{aligned}$$

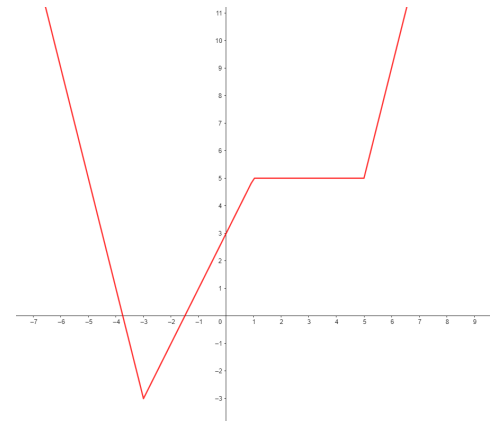


PŘÍKLAD 0.11.11 SESTROJTE GRAF FUNKCE

$$f: y = 2|x-5| + (3x+9) - |1-x| - 15$$

KULOVÉ BODY: -3, 1, 5

	$(-\infty, -3)$	$(-3, 1)$	$(1, 5)$	$(5, \infty)$
$x-5$	-	-	-	+
$3x+9$	-	+	+	+
$1-x$	+	+	-	-



$$x \in (-\infty, -3) : -2(x-5) - (3x+9) - (1-x) = -4x - 15$$

$$x \in (-3, 1) : -2(x-5) + (3x+9) - (1-x) = 2x + 3$$

$$x \in (1, 5) : -2(x-5) + (3x+9) - [-(1-x)] = 5$$

$$x \in (5, \infty) : 2(x-5) + (3x+9) + (1-x) = 4x - 15$$

PŘÍKLAD 0.12.N PĚŠTE NEBOVNICI S ABSOLUTNÍ
 HODNOTOU $3|x-2| - 6|x| < 2x-1$

NULOVÉ BODY: 0, 2

	$(-\infty, 0)$	$(0, 2)$	$(2, \infty)$
$x-2$	-	-	+
x	-	+	+
	I.	II.	III.

$$\text{I. } 3(2-x) - 6(-x) < 2x-1$$

$$-3x + 6x - 2x < -1 - 6$$

$$x < -7$$

$$x \in (-\infty, -7)$$

$$\text{II. } 3(2-x) - 6x < 2x-1$$

$$6+1 < 2x+6x+3x$$

$$\frac{7}{11} < x$$

$$x \in (\frac{7}{11}, 2)$$

$$\text{III. } 3(x-2) - 6x < 2x-1$$

$$-6+1 < 2x+6x-3x$$

$$-1 < x$$

$$x \in (2, \infty)$$

$$\underline{\underline{x \in (-\infty, -7) \cup (\frac{7}{11}, \infty)}}$$