Rovnice s parametrem

13.1. pro $p = -1$ je $K = \emptyset$

pro $p = 1$ je $K = \mathbb{R}$

pro $p \neq -1 \wedge p \neq 1$ je $K = \left\{ \frac{1}{p+1} \right\}$

13.2 pro $p = -1$ je $K = \mathbb{R}$

pro $p = 0$ je $K = \emptyset$

pro $p \neq -1 \wedge p \neq 0$ je $K = \left\{ \frac{1}{p} \right\}$

$$5p(px-1)-2x(2p^2+1)+x=3-4.(p+1)$$

$$5p^2x-5p-4xp^2-2x+x=3-4p-4$$

$$p^2x-5p-x=-4p-1$$

$$p^2x-x=p-1$$

$$x.(p^2-1)=p-1$$

$$x.(p+1).(p-1)=p-1$$

a) $p=-1$

$0=-2$

$K_1=\emptyset$

b) $p=1$

$0=0$

$K_2=R$

c) $p\neq\pm1$

$x=\dfrac{1}{p+1}$

$K_3=\left\{\dfrac{1}{p+1}\right\}$

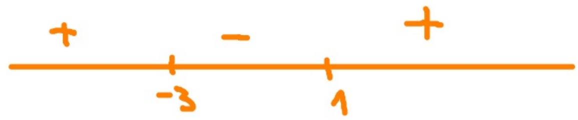
13.3

$$x^2-(p+5)x+7+2p=0$$

$$D=(p+5)^2-4(7+2p)=$$

$$=p^2+10p+25-28-8p=p^2+2p-3=$$

$$=(p+3)\cdot(p-1)$$



a) pro $p\in(-\infty,-3)\cup(1,\infty)$

$$x_{1,2}=\frac{p+5\pm\sqrt{(p+3)(p-1)}}{2}$$

$$K_1=\left\{\frac{p+5+\sqrt{(p+3)(p-1)}}{2},\ \frac{p+5-\sqrt{(p+3)(p-1)}}{2}\right\}$$

b) pro $p = -3 \vee p = 1$

$x_{1,2} = \dfrac{p+5}{2}$ → pro $p=-3$ je $K_2 = \{1\}$; pro $p = 1$ je $K_2 = \{3\}$

c) pro $p \in (-3, 1)$

$D < 0 \Rightarrow K_3 = \emptyset$

pro $p \in (-\infty, -3) \cup (1, \infty)$ je $K = \left\{ \dfrac{p+5+\sqrt{p^2+2p-3}}{2} ; \dfrac{p+5-\sqrt{p^2+2p-3}}{2} \right\}$

pro $p = -3$ je $K = \{1\}$

pro $p \in (-3, 1)$ je $K = \emptyset$

pro $p = 1$ je $K = \{3\}$

13.4

$$(p+1)x^2 + px - 1 = 0$$

pro $p = -1$

$-x - 1 = 0$

$x = -1$

pro $p \neq -1$

$D = (p+2)^2$

pro $p = -1$ je $K = \{-1\}$

pro $p = -2$ je $K = \{-1\}$

pro $p \neq -2 \wedge p \neq -1$

je $K = \left\{-1; \frac{1}{p+1}\right\}$

13.5

$$x^2 - px + 5x + 10 - 3p = 0$$

$$D = 0$$

$$D = (5-p)^2 - 4(10-3p) = p^2 - 10p + 25 - 40 + 12p =$$

$$= p^2 + 2p - 15 = (p+5)(p-3) = 0$$

a) $p = -5$

$K = \{-5\}$

b) $p = 3$

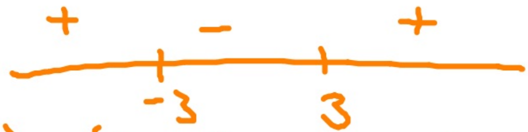
$K = \{-1\}$

Nerovnice s parametrem

14.1

$$p^2(x-1)+3(p-3x) \leqq 0$$

$$x(p-3)\cdot(p+3) \leqq p\cdot(p-3)$$



a) $p \in (-\infty,-3)\cup(3,\infty)$

$$x \leqq \frac{p}{p+3}$$

$$K_1 = \left(-\infty, \frac{p}{p+3}\right\rangle$$

b) $p \in (-3,3)$

$$x \geqq \frac{p}{p+3}$$

$$K_2 = \left\langle \frac{p}{p+3}; \infty\right)$$

c) pro $p = -3$

$0 \leqq 18$

$K_3 = \mathbb{R}$

d) pro $p = 3$

$0 \leqq 0$

$K_4 = \mathbb{R}$

14.2

$x \cdot (p+4) \cdot (p-2) > 3(p-2)$

pro $p \in (-\infty, -4) \cup (2, \infty)$

je $K = \left(\frac{3}{p+4}; \infty\right)$

pro $p \in (-4, 2)$ je $K = \left(-\infty, \frac{3}{p+4}\right)$

pro $p = -4$ je $K = \mathbb{R}$

pro $p = 2$ je $K = \emptyset$

14.3

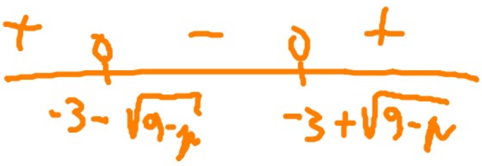
pro $p<9$ je $K=(-\infty;-3-\sqrt{9-p})\cup(-3+\sqrt{9-p};\infty)$

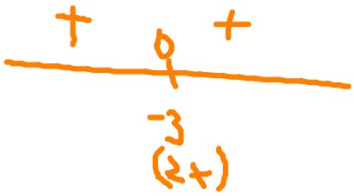
pro $p=9$ je $K=\mathbb{R}-\{-3\}$

pro $p>9$ je $K=\mathbb{R}$

$x^2+6x+p>0$

$D=36-4p=4\cdot(9-p)$



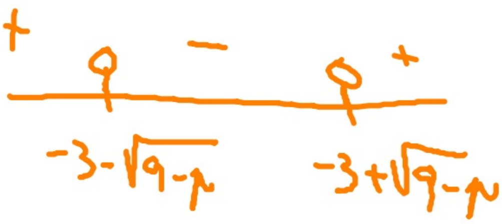


$x^2 + 6x + p > 0$

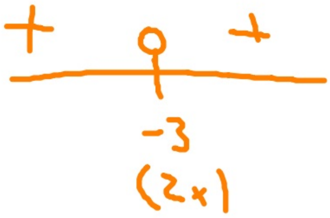
$D = 36 - 4p = 4\cdot(9-p)$

a) $p \in (-\infty, +9)$

$x_{1,2} = \dfrac{-6 \pm 2\sqrt{9-p}}{2}$



b) $p = 9$



c) $p \in (9, \infty)$

14.4

$$\frac{x}{p} + \frac{1+3x}{2} > \frac{x+2}{p}$$

a) pro $p = 0$ nemá smysl

b) pro $p > 0$

$$2x + p(1+3x) > 2(x+2)$$

$$x \cdot 3p > 4 - p$$

$$x > \frac{4-p}{3p}$$

$$K_1 = \left(\frac{4-p}{3p}; \infty\right)$$

c) pro $p < 0$

$$2x + p(1+3x) < 2(x+2)$$

$$x \cdot 3p < 4 - p$$

$$x > \frac{4-p}{3p}$$

$$K_2 = \left(\frac{4-p}{3p}; \infty\right)$$

pro $p = 0$ nemá smysl
pro $p \neq 0$ je $K = \left(\frac{4-p}{3p}; \infty\right)$

14.5

$|x-5| \leq p+2$

$|x-1| = 3$

$|x-p| = q$

a) pro $p \in (-\infty, -2)$

$L \geq 0 \wedge P < 0 \Rightarrow K_1 = \emptyset$

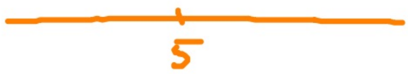
b) pro $p \in (-2, \infty)$

$K_2 = \langle 3-p; 7+p \rangle$

c) pro $p = -2$

$|x-5| \leq 0$ $K_3 = \{5\}$

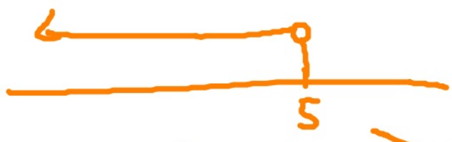
$|x-5| \leqq p+2$



a) $x \in (-\infty, 5)$

$-x+5 \leqq p+2$

$x \geqq 3-p$



pro $p>-2$ — $K_1 = \langle 3-p; 5)$

pro $p=-2$ — $K_2 = \emptyset$

pro $p<-2$ — $K_3 = \emptyset$

b) $x \in \langle 5; \infty)$

$x-5 \leqq p+2$

$x \leqq 7+p$

$p<-2$ — $K_1 = \emptyset$

$p=-2$ — $K_2 = \{5\}$

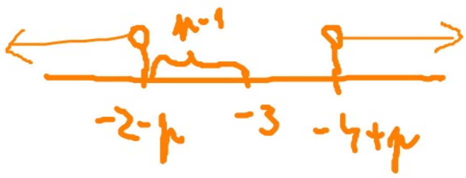
$p>-2$ — $K_3 = \langle 5; 7+p\rangle$

$$|x+3| > p-1$$

pro $p \in (-\infty, 1)$ je $K = \mathbb{R}$

pro $p = 1$ je $K = \mathbb{R} - \{-3\}$

pro $p \in (1, \infty)$ je $K = (-\infty, -2-p) \cup (-4+p; \infty)$



Obvody a obsahy rovinných obrazců

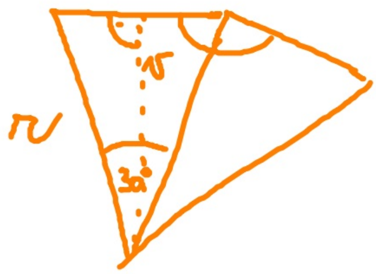
15.1

$o = 62{,}4$ cm

$S = 299$ cm^2

$n = 54$

$\alpha = 150°$



15.2

$o = 29{,}5$ cm

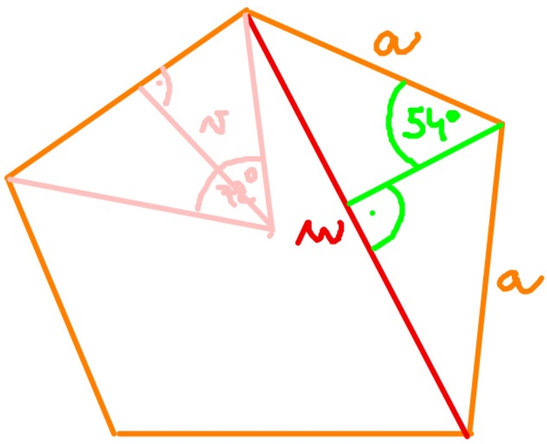
$S = 59{,}5$ cm^2

$n = 5$

$a = 5{,}9$ cm

$v = 4$ cm

15.3



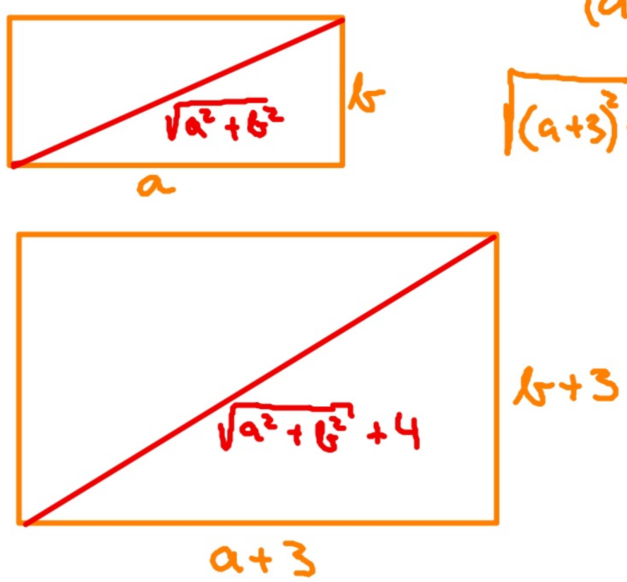
$o = 24{,}5$ cm

$S = 42{,}5$ cm²

$a = 4{,}95$ cm

$v = 3{,}4$ cm

15.4



$$(a+3)(b+3) = a.b+60$$

$$\sqrt{(a+3)^2+(b+3)^2} = \sqrt{a^2+b^2}+4$$

$$(a+3)(b+3)=ab+60$$

$$\sqrt{(a+3)^2+(b+3)^2}=\sqrt{a^2+b^2}+4$$

$$a+b=17 \longrightarrow a=17-b$$

$$\sqrt{(20-b)^2+(b+3)^2}=\sqrt{(17-b)^2+b^2}+4$$

$$400-40b+b^2+b^2+6b+9=289-34b+2b^2+8\sqrt{(17-b)^2+b^2}+16$$

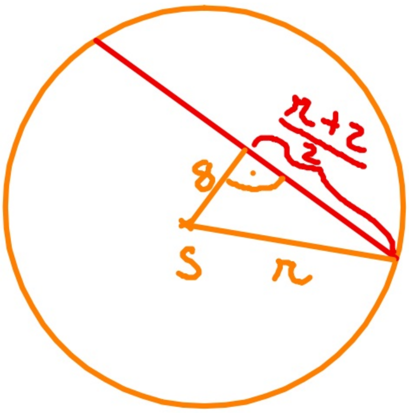
$$104=8\sqrt{(17-b)^2+b^2} \quad /^2$$

$$169=289-34b+2b^2$$

$$b^2-17b+60=0$$

$$(b-5)(b-12)=0 \quad \left[\begin{array}{l} b_1=5 \rightarrow a_1=12 \\ b_2=12 \rightarrow a_2=5 \end{array}\right.$$

15.5



$$r^2 = 8^2 + \left(\frac{r+2}{2}\right)^2$$

$$4r^2 = 256 + r^2 + 4r + 4$$

$$3r^2 - 4r - 260 = 0$$

$$r_{1,2} = \frac{4 \pm \sqrt{16+3120}}{6}$$

$r_1 = -\frac{52}{6} \rightarrow$ nesmysl

$r_2 = 10$ cm

$o = 2\pi r = 62,8$ cm

$S = \pi r^2 = 314$ cm^2