

1/ Riešte v R neúplné kvadratické rovnice bez použitia diskriminantu:

a) $2x^2 + 9x = 0$

$x(2x+9) = 0$

$x_1=0 \text{ a } 2x+9=0$

$x=-9/2=-4,5 \Rightarrow K=\{-4,5; 0\}$

b) $3x^2 = 6x \quad / -6x$

$3x^2 - 6x = 0$

$3x(x-6) = 0$

$x_1=0 \quad x_2=6 \Rightarrow K=\{0, 6\}$

c) $4x^2 - 64 = 0$

$(2x)^2 - 8^2 = 0$

$(2x+8)(2x-8)=0$

$2x+8=0 \text{ a } 2x-8=0$

$x_1=-4 \text{ a } x_2=4 \Rightarrow K=\{-4, 4\}$

d) $16 - 7x^2 = 79 \quad / -79$

$-7x^2 - 63 = 0$

$-7(x^2 - 9) = 0$

$-7(x-3)(x+3) = 0$

$x_1=3 \quad x_2=-3 \Rightarrow K=\{-3, 3\}$

d) $1,8x^2 - 2 = 3 \quad / -3$

$1,8x^2 - 5 = 0 \quad / :1,8$

$x^2 - \frac{5}{1,8} = 0$

$x^2 - \frac{50}{18} = 0$

$x^2 - \frac{25}{9} = 0$

$x^2 - \left(\frac{5}{3}\right)^2 = 0$

$\left(x - \frac{5}{3}\right)\left(x + \frac{5}{3}\right) = 0 \Rightarrow x_1 = \frac{5}{3} \wedge x_2 = -\frac{5}{3} \Rightarrow K = \left\{-\frac{5}{3}, \frac{5}{3}\right\}$

e) $(2x - 3)^2 = 81 - 12x$

f) $2x^2 + 9x = 0$

2/ Riešte v Z úplné kvadratické rovnice (ak sa dá bez diskriminantu):

a) $x^2 - 4x + 4 = 0$
 $x^2 - 2 \cdot 2x + 2^2 = 0$

$$(x-2)^2 = 0$$

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

$$x = 2 \in \mathbb{Z} \Rightarrow \underline{K = \{2\}}$$

b) $x^2 + 6x + 9 = 0$

$$x^2 + 2 \cdot x \cdot 3 + 3^2 = 0 \quad a^2 + 2 \cdot a \cdot b + b^2 = (a+b)^2$$

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

$$(x+3)(x+3) = 0$$

$$x = -3 \in \mathbb{Z} \Rightarrow \underline{K = \{-3\}}$$

c) $x^2 + 2,4x + 1,44 = 0$

$$x^2 + 2 \cdot x \cdot 1,2 + 1,2^2 = 0$$

$$(x+1,2)^2 = 0$$

$$x = -1,2 \notin \mathbb{Z} \Rightarrow \underline{K = \{\}}$$

d) $x^2 - x + 0,25 = 0$ **D.ú.**

3/ Riešte v N pomocou diskriminantu:

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

a) $x^2 - 5x - 24 = 0 \quad ax^2 + bx + c = 0$

$$a=1 \quad b=-5 \quad c=-24 \Rightarrow D = b^2 - 4ac = 25 - 4 \cdot 1 \cdot (-24) = 25 + 96 = 121 > 0 \Rightarrow 2 \text{ riešenia}$$

$$x_{1,2} = \frac{-(-5) \pm \sqrt{121}}{2 \cdot 1} = \frac{+5 \pm 11}{2}$$

$$x_1 = \frac{16}{2} = 8 \in \mathbb{N} \quad x_2 = \frac{-6}{2} = -3 \notin \mathbb{N} \Rightarrow \underline{K = \{8\}}$$

b) $x^2 - 4x + 15 = 0$

$$a=1 \quad b=-4 \quad c=+15 \Rightarrow D = b^2 - 4ac = 16 - 4 \cdot 1 \cdot 15 = 16 - 60 = -44 < 0 \Rightarrow 0 \text{ riešení}$$

$$\Rightarrow \underline{K = \{\}}$$

c) $3x^2 - 3x - 6 = 0$

$$a=3 \quad b=-3 \quad c=-6 \Rightarrow D = b^2 - 4ac = 9 - 4 \cdot 3 \cdot (-6) = 9 + 72 = 81 > 0 \Rightarrow 2 \text{ riešenia}$$

$$x_{1,2} = \frac{-(-3) \pm \sqrt{81}}{2 \cdot 3} = \frac{+3 \pm 9}{6}$$

$$x_1 = \frac{12}{6} = 2 \in \mathbb{N} \quad x_2 = \frac{-6}{6} = -1 \notin \mathbb{N} \Rightarrow \underline{K = \{2\}}$$

d) $x^2 - 5x - 6 = 0$ **D.ú.**

4/ Upravte do tvaru kvadratickej rovnice v základnom tvare a vyriešte pomocou vzorca v R:

a) $x^2 - 4x = 4x - 15 \quad /- 4x \quad /+15$

$$x^2 - 8x + 15 = 0$$

$a=1 \quad b=-8 \quad c=15 \quad \Rightarrow D=b^2-4ac=64-4 \cdot 1 \cdot 15=64-60=4 > 0 \Rightarrow 2 \text{ riešenia}$

$$x_{1,2} = \frac{-(-8) \pm \sqrt{4}}{2 \cdot 1} = \frac{+8 \pm 2}{2}$$

$$x_1 = \frac{10}{2} = 5 \in N \quad x_2 = \frac{6}{2} = 3 \in N \quad \Rightarrow \underline{K=\{3, 5\}}$$

b) $2x^2 + 11x + 31 = 3 - 19x$ **D.ú.**

c) $3x^2 - 2x + \frac{1}{3} = 0$

d) $(6 - x) \cdot (2x - 5) + 30 = 0$

e) $x(x - 2) = 2$

f) $(x - 6)^2 + (x - 8)^2 = 0$