

PRIMJER 2. PISANE PROUVJERE -
KVADRATNE JEDNAŽBE

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22 boda

1. Izračunaj:

a) $5x^2 - 2x = 0$

$$x(5x - 2) = 0$$

$$\downarrow \qquad \downarrow$$

$$x_1 = 0 \qquad 5x_2 = 2 / : 5$$

$$x_2 = \frac{2}{5}$$

(+1)

b) $5x^2 - 3 = 0$

$$5x^2 = 3 / : 5$$

$$x^2 = \frac{3}{5} / \sqrt{\quad}$$

$$x = \sqrt{\frac{3}{5}}$$

$$x = \pm \sqrt{\frac{3}{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}}$$

$$x = \pm \frac{\sqrt{15}}{5}$$

(+1)

c) $5x^2 - 2x - 3 = 0$

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

$$= \frac{2 \pm \sqrt{4 + 60}}{10}$$

$$= \frac{2 \pm \sqrt{64}}{10}$$

$$= \frac{2 \pm 8}{10}$$

$$= \frac{1 \pm 4}{5}$$

$$\downarrow \qquad \downarrow$$

$$x_1 = \frac{1+4}{5} \qquad x_2 = \frac{1-4}{5}$$

$$= 1 \qquad = -\frac{3}{5}$$

(+1)

2. Izračunaj:

a) $x \cdot |x - 3| - 2 = 0$

$$\begin{array}{l} + \\ x - 3 > 0 \\ x > 3 \end{array} \qquad \begin{array}{l} - \\ x - 3 \leq 0 \\ x \leq 3 \end{array}$$

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

$$x_{1,2} = \frac{3 \pm \sqrt{9 + 8}}{2}$$

$$= \frac{3 \pm \sqrt{17}}{2}$$

$$\downarrow \qquad \downarrow$$

$$x_1 = \frac{3 + \sqrt{17}}{2} \qquad x_2 = \frac{3 - \sqrt{17}}{2}$$

(+1)

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

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

$$x_{1,2} = \frac{-3 \pm \sqrt{9 - 8}}{-2}$$

$$= \frac{-3 \pm \sqrt{1}}{-2}$$

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

$$\downarrow \qquad \downarrow$$

$$x_3 = \frac{-3 + 1}{-2} \qquad x_4 = \frac{-3 - 1}{-2}$$

$$= \frac{-2}{-2} \qquad = \frac{-4}{-2}$$

$$= 1 \qquad = 2$$

(+1)

b) $x^2 + 20x + 136 = 0$

$$x_{1,2} = \frac{-20 \pm \sqrt{400 - 544}}{2}$$

$$= \frac{-20 \pm \sqrt{-144}}{2}$$

$$= \frac{-20 \pm 12i}{2}$$

$$\downarrow \qquad \downarrow$$

$$x_1 = \frac{-20 + 12i}{2} \qquad x_2 = \frac{-20 - 12i}{2}$$

$$= -10 + 6i \qquad = -10 - 6i$$

(+2)

3. Za koje su vrijednosti realnog parametra m rješenja jednadžbe $2x^2 - mx + 2 - 3m^2 = 0$ realna, a za koja nisu?

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

$$D \geq 0 \quad (+1)$$

$$b^2 - 4ac \geq 0$$

$$m^2 - 4 \cdot [2 \cdot (2 - 3m^2)] \geq 0 \quad (+1)$$

$$m^2 - 4 \cdot [4 - 6m^2] \geq 0$$

$$m^2 - 16 + 24m^2 \geq 0$$

$$25m^2 - 16 \geq 0$$

$$25m^2 \geq 16 : 25$$

$$m^2 \geq \frac{16}{25}$$

$$m \geq \frac{4}{5} \quad (+1)$$

$$m \in \left(-\infty, -\frac{4}{5}\right) \cup \left[\frac{4}{5}, +\infty\right) \quad (+1)$$

4. Dana je kvadratna jednadžba $(2px - 1)^2 = p(p - 2x)$.

Za koje vrijednosti od p ova jednadžba ima realna rješenja?

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

$$4p^2x^2 - 4px + 1 = p^2 - 2px$$

$$4p^2x^2 - 2px + 1 - p^2 = 0$$

$$D \geq 0 \quad (+1)$$

$$(-2p)^2 - 4 \cdot 4p^2(1 - p^2) \geq 0 \quad (+1)$$

$$4p^2 - 16p^2(1 - p^2) \geq 0$$

$$4p^2(1 - 4 + 4p^2) \geq 0$$

$$4p^2(4p^2 - 3) \geq 0$$

$$\downarrow$$

$$4p^2 \geq 0$$

$$p \geq 0$$

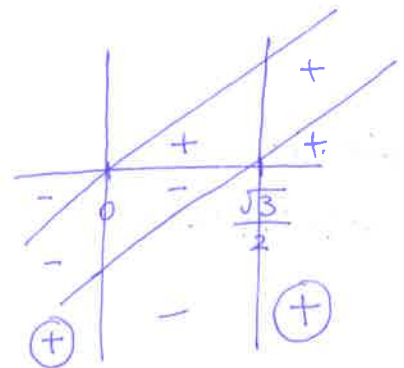
$$4p^2 - 3 \geq 0$$

$$4p^2 \geq 3 : 4$$

$$p^2 \geq \frac{3}{4} \sqrt{\quad}$$

$$p = \frac{\sqrt{3}}{2} \quad (+1)$$

ili



(+1)

5. Riješi jednadžbu:

$$s = s_0 + vt - \frac{1}{2}gt^2 \quad (pot)$$

$$-\frac{1}{2}gt^2 + vt + s_0 - s = 0 \quad (+1)$$

$$t_{1,2} = \frac{-v \pm \sqrt{v^2 + 4 \cdot \left(\frac{-1}{2}\right)g \cdot (s_0 - s)}}{2 \cdot \left(\frac{-1}{2}\right)g} = \frac{-v \pm \sqrt{v^2 + 4 \cdot \left(\frac{-1}{2}\right)g \cdot (s_0 - s)}}{-2g}$$

$$= \frac{v \pm \sqrt{v^2 + \frac{-4}{2}g \cdot (s_0 - s)}}{g} = \frac{v \pm \sqrt{v^2 - 2g(s_0 - s)}}{g} \quad (+1)$$

6. Izračunaj kvadratnu jednačinu:

$$3x^3 + 13x^2 + 13x + 3 = 0$$

$$3(x^3+1) + 13x \cdot (x+1) = 0$$

$$3(x+1)(x^2-x-1) + 13x(x+1) = 0 \quad (+1)$$

$$(x+1) \cdot [3(x^2-x-1) + 13x] = 0$$

$$(x+1) \cdot (3x^2 - 3x + 3 + 13x) = 0$$

$$(x+1) \cdot (3x^2 + 10x + 3) = 0$$

$$\downarrow$$
$$x+1=0$$
$$x_1 = -1$$

(+1)

$$\downarrow$$
$$x_{2,3} = \frac{-10 \pm \sqrt{100 + 144}}{6}$$
$$= \frac{-10 \pm \sqrt{244}}{6}$$

$$= \frac{-10 \pm \sqrt{4 \cdot 61}}{6} \quad (+1)$$

$$= \frac{-10 \pm 2\sqrt{61}}{6}$$

$$= \frac{-5 \pm \sqrt{61}}{3}$$

$$\downarrow \quad \downarrow$$
$$x_2 = \frac{-5 + \sqrt{61}}{3} \quad x_3 = \frac{-5 - \sqrt{61}}{3}$$

7. Izračunaj iracionalnu jednačinu:

$$\sqrt{6x+1} + 3 = 2x$$

$$\sqrt{6x+1} = 2x - 3/2$$

$$6x+1 = 4x^2 - 12x + 9$$

$$4x^2 - 18x + 8 = 0 \quad /:2$$

$$2x^2 - 9x + 4 = 0 \quad (+1)$$

$$x_{1,2} = \frac{9 \pm \sqrt{81 - 32}}{4}$$

$$= \frac{9 \pm 7}{4}$$

$$\downarrow \quad \downarrow \quad (+1)$$
$$x_1 = \frac{9+7}{4} \quad x_2 = \frac{9-7}{4}$$

$$= \frac{16}{4}$$

$$= \frac{2}{4}$$

$$= 4$$

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

