

KVADRATNE ENAČBE

$$ax^2 + bx + c = 0$$

$$x^2 + 5x + 6 = 0$$

$$a=1 \quad b=5 \quad c=6$$

$$D = b^2 - 4ac$$

$$D = 5^2 - 4 \cdot 1 \cdot 6$$

$$D = 25 - 24$$

$$D = 1$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

$$x_1 = \frac{-5 + \sqrt{1}}{2 \cdot 1}$$

$$x_1 = \frac{-5 + 1}{2}$$

$$x_1 = -\frac{4}{2}$$

$$\underline{\underline{x_1 = -2}}$$

$$x_2 = \frac{-b - \sqrt{D}}{2a}$$

$$x_2 = \frac{-5 - \sqrt{1}}{2 \cdot 1}$$

$$x_2 = \frac{-5 - 1}{2}$$

$$x_2 = -\frac{6}{2}$$

$$\underline{\underline{x_2 = -3}}$$

$$2x^2 - 5x + 3 = 0$$

$$a=2 \quad b=-5 \quad c=3$$

$$D = b^2 - 4ac$$

$$D = (-5)^2 - 4 \cdot 2 \cdot 3$$

$$D = 25 - 24$$

$$D = 1$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

$$x_1 = \frac{-(-5) + \sqrt{1}}{2 \cdot 2}$$

$$x_1 = \frac{5 + 1}{4}$$

$$x_1 = \frac{6}{4} = \frac{3}{2} = \underline{\underline{1\frac{1}{2}}}$$

$$x_2 = \frac{-b - \sqrt{D}}{2a}$$

$$x_2 = \frac{-(-5) - \sqrt{1}}{2 \cdot 2}$$

$$x_2 = \frac{5 - 1}{4}$$

$$x_2 = \frac{4}{4} = \underline{\underline{1}}$$

$$(4x - 11) \cdot (x - 2) = (x - 2) \cdot (x - 4) + 4$$

$$4x^2 - 8x - 11x + 22 = x^2 - 4x - 2x + 8 + 4$$

$$4x^2 - 19x + 22 = x^2 - 6x + 12$$

$$\underline{\underline{4x^2 - 19x + 22 - x^2 + 6x - 12 = 0}}$$

$$3x^2 - 13x + 10 = 0$$

$$a=3 \quad b=-13 \quad c=10$$

$$D = b^2 - 4ac$$

$$D = (-13)^2 - 4 \cdot 3 \cdot 10$$

$$D = 169 - 120$$

$$D = 49$$

$$x_1 = \frac{-b + \sqrt{D}}{2a} \quad x_2 = \frac{-b - \sqrt{D}}{2a}$$

$$x_1 = \frac{-(-13) + \sqrt{49}}{2 \cdot 3} \quad x_2 = \frac{-(-13) - \sqrt{49}}{2 \cdot 3}$$

$$x_1 = \frac{13 + 7}{6} \quad x_2 = \frac{13 - 7}{6}$$

$$x_1 = \frac{20}{6} = \frac{10}{3} = \underline{\underline{3\frac{1}{3}}} \quad x_2 = \frac{6}{6} = \underline{\underline{1}}$$

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

$$(\overset{a}{x} + \overset{b}{5})^2 - (x+5) \cdot (x-4) = 22 - (x+3) \cdot (x-3)$$

$$x^2 + 2 \cdot x \cdot 5 + 5^2 - (x^2 - 4x + 5x - 20) = 22 - (x^2 - 3x + 3x - 9)$$

$$\cancel{x^2} + \underline{10x} + \underline{25} - \cancel{x^2} + \underline{4x} - \underline{5x} + \underline{20} = \underline{22} - \cancel{x^2} + \underline{3x} - \underline{3x} + \underline{9}$$

$$\underline{9x} + 45 = -x^2 + 3$$

$$x^2 + 9x + \underline{45 - 31} = 0$$

$$x^2 + 9x + 14 = 0$$

$$a = 1 \quad b = 9 \quad c = 14$$

$$D = b^2 - 4ac$$

$$D = 9^2 - 4 \cdot 1 \cdot 14$$

$$D = 81 - 56$$

$$D = 25$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

$$x_1 = \frac{-9 + \sqrt{25}}{2 \cdot 1}$$

$$x_1 = \frac{-9 + 5}{2}$$

$$x_1 = -\frac{4}{2} = \underline{\underline{-2}}$$

$$x_2 = \frac{-b - \sqrt{D}}{2a}$$

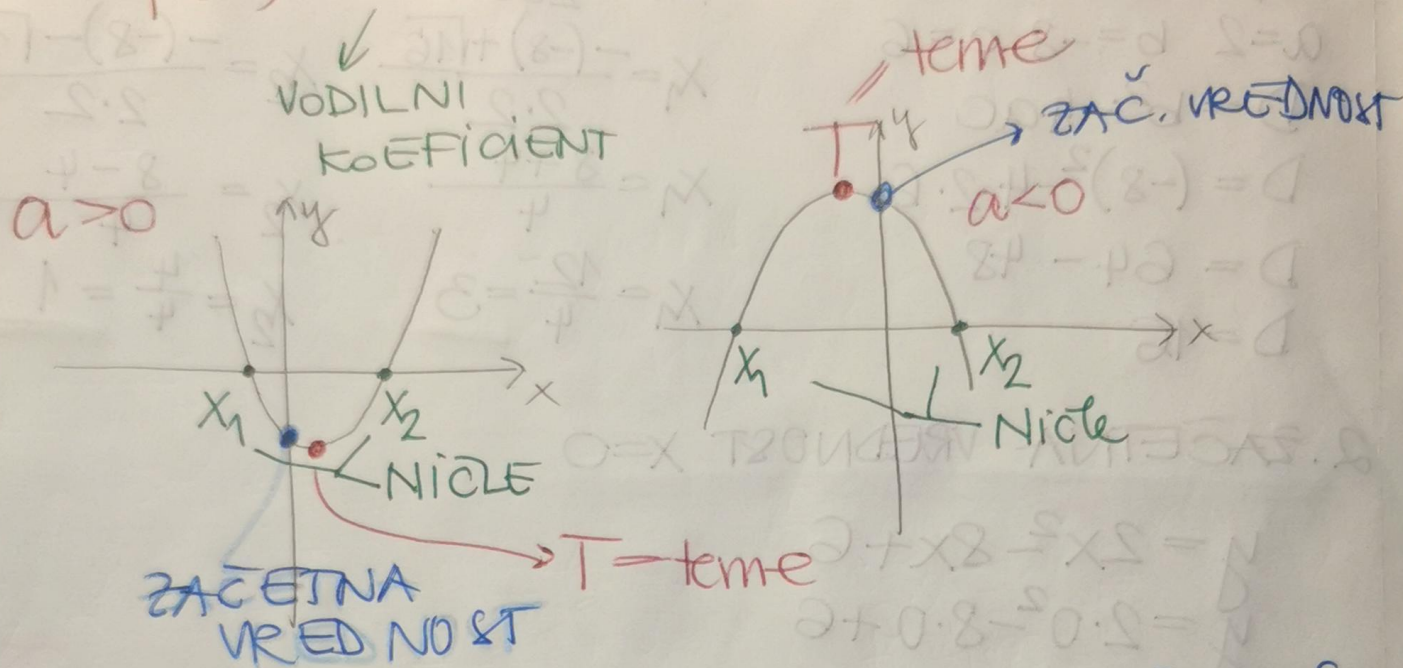
$$x_2 = \frac{-9 - \sqrt{25}}{2 \cdot 1}$$

$$x_2 = \frac{-9 - 5}{2}$$

$$x_2 = -\frac{14}{2} = \underline{\underline{-7}}$$

KVADRATNA FUNKCIJA

$$f(x) = ax^2 + bx + c$$



Dana je funkcija $f(x) = x^2 + 2x - 3$. Nariši graf.

1. NIĆE $y=0$

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

$$a=1 \quad b=2 \quad c=-3$$

$$D = b^2 - 4ac$$

$$D = 2^2 - 4 \cdot 1 \cdot (-3)$$

$$D = 4 + 12$$

$$D = 16$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

$$x_1 = \frac{-2 + \sqrt{16}}{2 \cdot 1}$$

$$x_1 = \frac{-2 + 4}{2}$$

$$x_1 = \frac{2}{2} = 1$$

$$x_2 = \frac{-b - \sqrt{D}}{2a}$$

$$x_2 = \frac{-2 - \sqrt{16}}{2 \cdot 1}$$

$$x_2 = \frac{-2 - 4}{2}$$

$$x_2 = \frac{-6}{2} = -3$$

2. ZAČETNA VREDNOST $x=0$

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

$$y = 0^2 + 2 \cdot 0 - 3$$

$$y = -3$$

→ Na y-osi

na x-osi

3. TEME $T(x, y)$

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

$$a = 1 \quad b = 2 \quad c = -3$$

$$p = -\frac{b}{2a}$$

$$q = -\frac{D}{4a}$$

$$p = -\frac{2}{2 \cdot 1}$$

$$q = -\frac{16}{4 \cdot 1}$$

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

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

$$p = -1$$

$$q = -4$$

$$T(-1, -4)$$

3. TEME $T(b, c)$

$$N = -0.5 + 5 \cdot 0 + 3$$

$$N = -X_5 + 5X + 3$$

$$D = \text{ve}$$

$$D = \text{tt} + \text{N}$$

$$D = 5 - \text{tt} \cdot (-1) \cdot 0$$

$$D = P_5 - \text{tt} \cdot 0$$

$$a = -1 \quad p = 5 \quad c = 3$$

$$-X_5 + 5X + 3 = 0$$

$$f(x) = -X_5 + 5X + 3$$

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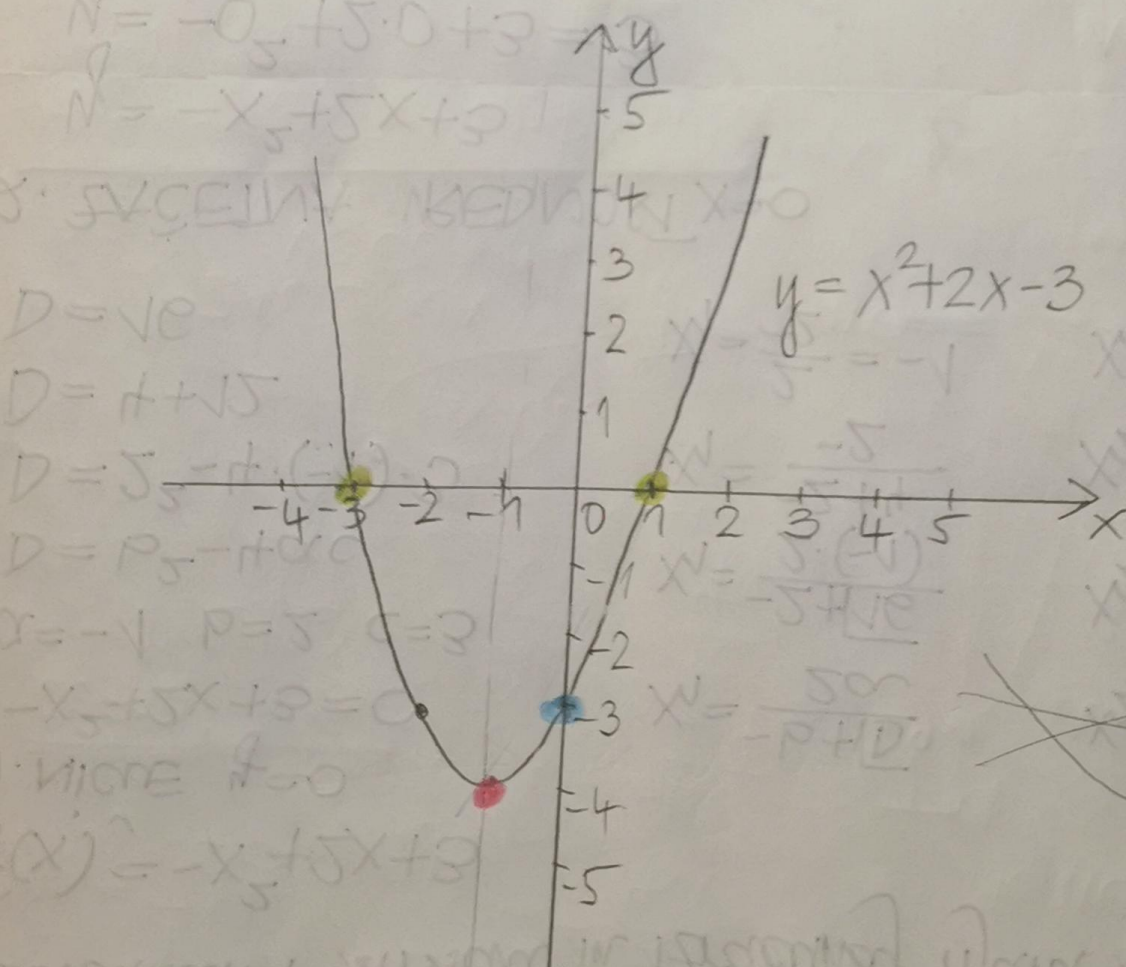
$$f(x) = -X_5 + 5X + 3$$

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Narisi graf funkcije $f(x) = 2x^2 - 8x + 6$

1. NIČLE $y=0$

$$2x^2 - 8x + 6 = 0$$

$$a=2 \quad b=-8 \quad c=6$$

$$D = b^2 - 4ac$$

$$D = (-8)^2 - 4 \cdot 2 \cdot 6$$

$$D = 64 - 48$$

$$D = 16$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

$$x_2 = \frac{-b - \sqrt{D}}{2a}$$

$$x_1 = \frac{-(-8) + \sqrt{16}}{2 \cdot 2}$$

$$x_2 = \frac{-(-8) - \sqrt{16}}{2 \cdot 2}$$

$$x_1 = \frac{8+4}{4}$$

$$x_2 = \frac{8-4}{4}$$

$$x_1 = \frac{12}{4} = 3$$

$$x_2 = \frac{4}{4} = 1$$

2. ZACETNA VREDNOST $x=0$

$$y = 2x^2 - 8x + 6$$

$$y = 2 \cdot 0^2 - 8 \cdot 0 + 6$$

$$y = 6$$

3. TEME

$$y = 2x^2 - 8x + 6$$

$$a=2 \quad b=-8 \quad c=6 \quad D=16$$

$$p = -\frac{b}{2a}$$

$$p = -\frac{-8}{2 \cdot 2}$$

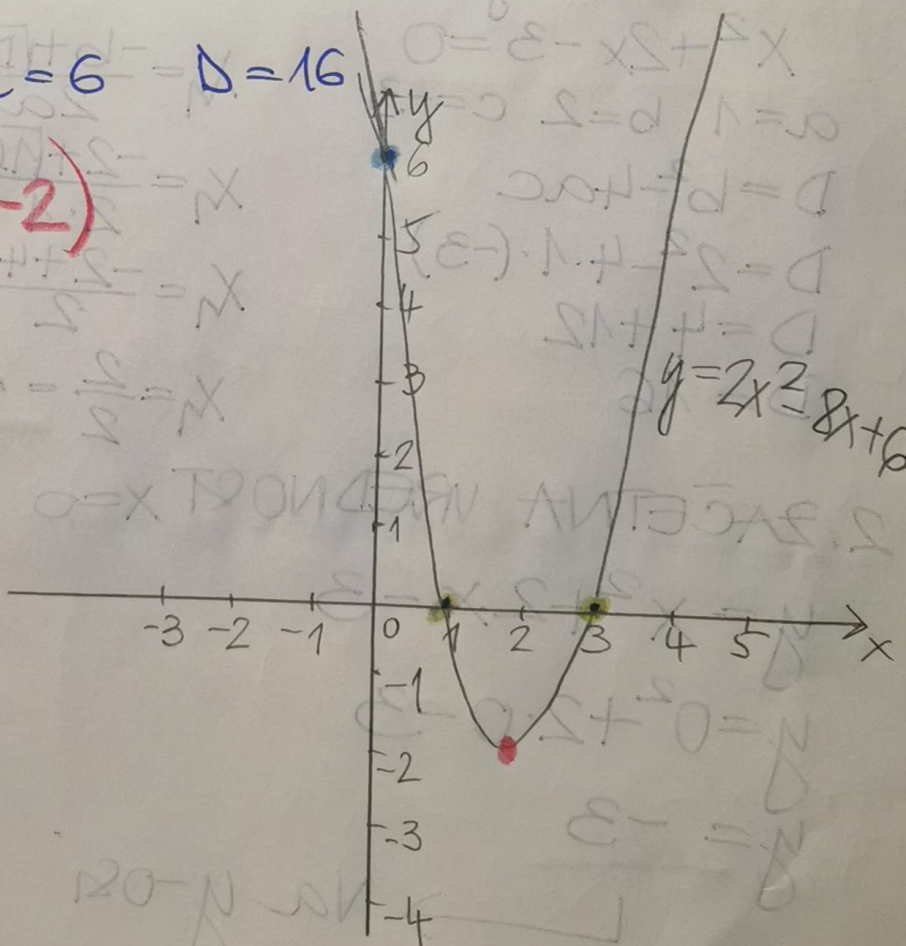
$$p = \frac{8}{4} = 2$$

$$q = -\frac{D}{4a}$$

$$q = -\frac{16}{4 \cdot 2}$$

$$q = -\frac{16}{8}$$

$$q = -2$$



Dani sta kvadratna funkcija $f(x) = -x^2 + 2x + 3$ in linearna funkcija $g(x) = 3x + 1$. Narišite obe v isti koordinatni sistem in izračunaj njuni presečišča!

$$f(x) = -x^2 + 2x + 3$$

1. Niče $y=0$

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

$$a = -1 \quad b = 2 \quad c = 3$$

$$D = b^2 - 4ac$$

$$D = 2^2 - 4 \cdot (-1) \cdot 3$$

$$D = 4 + 12$$

$$D = 16$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

$$x_1 = \frac{-2 + \sqrt{16}}{2 \cdot (-1)}$$

$$x_1 = \frac{-2 + 4}{-2}$$

$$x_1 = \frac{2}{-2} = -1$$

$$x_2 = \frac{-b - \sqrt{D}}{2a}$$

$$x_2 = \frac{-2 - \sqrt{16}}{2 \cdot (-1)}$$

$$x_2 = \frac{-2 - 4}{-2}$$

$$x_2 = \frac{-6}{-2} = 3$$

2. ZACETNA VREDNOST $x=0$

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

$$y = -0^2 + 2 \cdot 0 + 3 = 3$$

3. TEME $T(p, q)$

$$a = -1 \quad b = 2 \quad c = 3 \quad D = 16$$

$$p = -\frac{b}{2a}$$

$$p = -\frac{2}{2 \cdot (-1)}$$

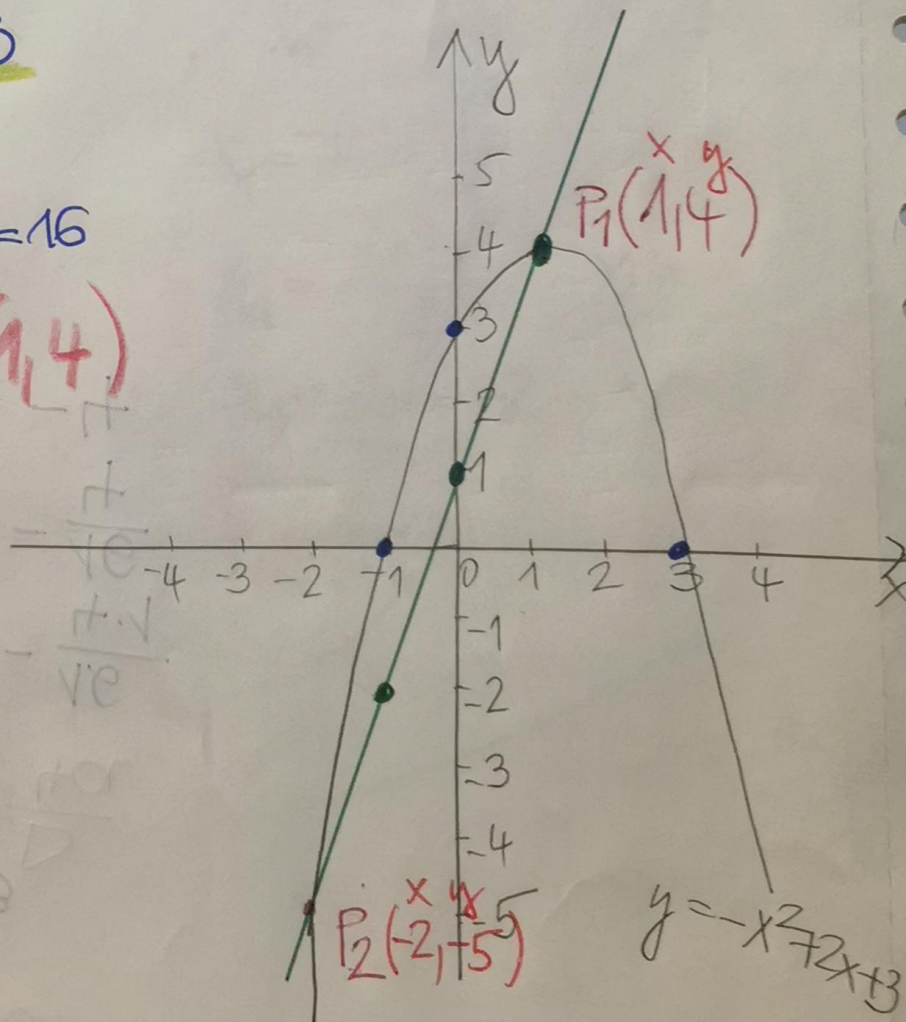
$$p = -\frac{2}{-2} = 1$$

$$q = \frac{-D}{4a}$$

$$q = \frac{-16}{4 \cdot (-1)}$$

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

$T(1, 4)$



$$g(x) = 3x + 1$$

$$y = 3x + 1$$

x	y
-1	-2
0	1
1	4

$$y = 3x + 1$$

$$y = 3 \cdot (-1) + 1 = -2$$

$$y = 3 \cdot 0 + 1 = 1$$

$$y = 3 \cdot 1 + 1 = 4$$

PRESEČIŠČE FUNKCIJ

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

$$y = 3x + 1$$

$$y = y$$

$$-x^2 + 2x + 3 = 3x + 1$$

$$-x^2 + 2x - 3x + 3 - 1 = 0$$

$$-x^2 - 1x + 2 = 0$$

$$a = -1 \quad b = -1 \quad c = 2$$

$$D = b^2 - 4ac$$

$$D = (-1)^2 - 4 \cdot (-1) \cdot 2$$

$$D = 1 + 8$$

$$D = 9$$

$$x_1 = \frac{-b + \sqrt{D}}{2a}$$

$$x_2 = \frac{-b - \sqrt{D}}{2a}$$

$$x_1 = \frac{-(-1) + \sqrt{9}}{2 \cdot (-1)}$$

$$x_2 = \frac{-(-1) - \sqrt{9}}{2 \cdot (-1)}$$

$$x_1 = \frac{1 + 3}{-2}$$

$$x_2 = \frac{1 - 3}{-2}$$

$$x_1 = \frac{4}{-2} = -2$$

$$x_2 = \frac{-2}{-2} = 1$$

$$y = 3x + 1$$

$$y_2 = 3 \cdot (-2) + 1 = -5$$

$$y_1 = 3 \cdot 1 + 1 = 4$$

$$P_2(-2, -5)$$

$$P_1(1, 4)$$

POLINOMI

$$p(x) = 3x^4 + 2x^3 - x^2 + 7x - 8$$

Stopnja polinoma: 4

Vodilni koeficient: 3

Vodilni člen: $3x^4$

Prosti člen: -8

Nariši graf polinoma $p(x) = x^3 + x^2 - 4x - 4$

1. NILE

$$x^3 + x^2 - 4x - 4 = 0$$

	x^3	x^2	x	
	1	1	-4	-4
-2	↓	-2	2	4
	1	-1	-2	0

Vsi delitelji: ~~1~~, ~~2~~, ~~4~~,
-1, -2, -4

$$x_1 = -2$$

$$1x^2 - 1x - 2 = 0$$

$$a=1 \quad b=-1 \quad c=-2$$

$$D = b^2 - 4ac$$

$$D = (-1)^2 - 4 \cdot 1 \cdot (-2)$$

$$D = 1 + 8$$

$$D = 9$$

$$x_2 = \frac{-b + \sqrt{D}}{2a} \quad x_3 = \frac{-b - \sqrt{D}}{2a}$$

$$x_2 = \frac{-(-1) + \sqrt{9}}{2 \cdot 1} \quad x_3 = \frac{-(-1) - \sqrt{9}}{2 \cdot 1}$$

$$x_2 = \frac{1+3}{2} \quad x_3 = \frac{1-3}{2}$$

$$x_2 = \frac{4}{2} = 2 \quad x_3 = \frac{-2}{2} = -1$$

$$x_1 = -2$$

(I. st.)

$$x_2 = 2$$

(I. st.)

$$x_3 = -1$$

(I. st.)

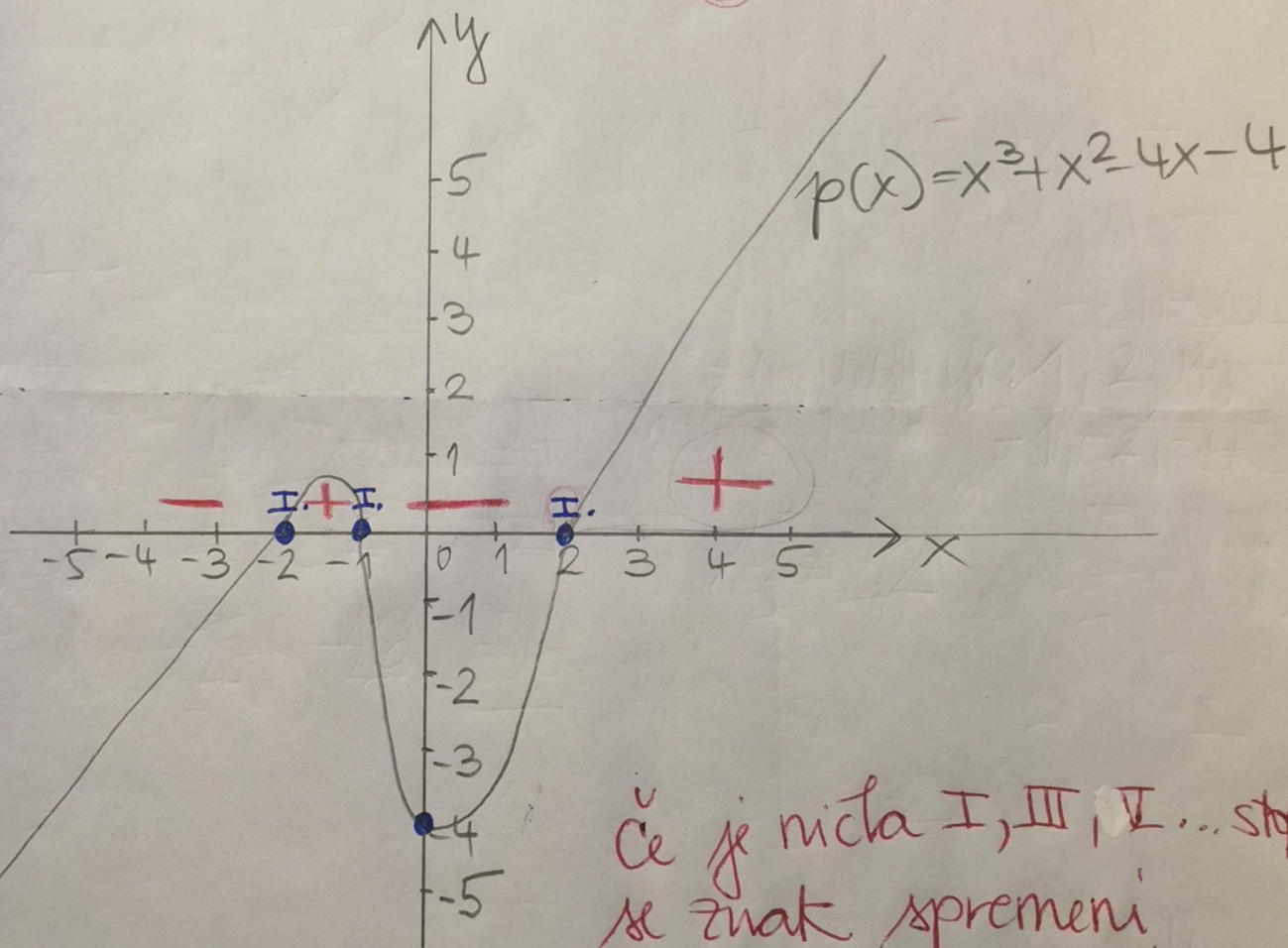
2. ZAČETNA VREDNOST $x=0$

$$y = x^3 + x^2 - 4x - 4$$

$$y = 0^3 + 0^2 - 4 \cdot 0 - 4 = \underline{-4}$$

3. PREDZNAK $p(x) = x^3 + x^2 - 4x - 4$

$$p(10) = 10^3 + 10^2 - 4 \cdot 10 - 4 = +1056$$



Če je ničla I, III, V... stopnje
se znak spremeni.
Če je ničla II, IV, VI... stopnje
se znak ohrani.