

Zadatak 12. Riješi jednađžbu $f'(x) = 0$, ako je:

1) $f(x) = x^3 - 6x^2 + 12x - 1$;

2) $f(x) = 2x^3 - 3x^2 - 12x + \sqrt{5}$;

3) $f(x) = x^4 - 4x^3 - 8x^2 + 11$;

4) $f(x) = x^5 - x^3 - 2x + 2^5$.

Rješenje. 1) $f'(x) = (x^3 - 6x^2 + 12x - 1)' = (x^3)' - (6x^2)' + (12x)' - 1' = 3x^2 - 12x + 12$,

$$3x^2 - 12x + 12 = 0$$

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

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

$$x = 2;$$

2) $f'(x) = (2x^3 - 3x^2 - 12x + \sqrt{5})' = 6x^2 - 6x - 12$,

$$6x^2 - 6x - 12 = 0$$

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

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

$$x_1 = -1, x_2 = 2;$$

3) $f'(x) = (x^4 - 4x^3 - 8x^2 + 11)' = 4x^3 - 12x^2 - 16x$,

$$4x^3 - 12x^2 - 16x = 0$$

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

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

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

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

$$x(x+1)(x-4) = 0$$

$$x_1 = -1, x_2 = 0, x_3 = 4;$$

4) $f'(x) = (x^5 - x^3 - 2x + 2^5)' = 5x^4 - 3x^2 - 2$,

$$5x^4 - 3x^2 - 2 = 0$$

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

$$3x^2(x^2 - 1) + 2(x^4 - 1) = 0$$

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

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

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

$$(x - 1)(x + 1)(5x^2 - 2) = 0$$

$$x_{1,2} = \pm 1$$

$$x_{3,4} = \pm \sqrt{-\frac{2}{5}} = \pm \sqrt{0.4}i.$$