

**(oficiu 10 puncte)****SUBIECTUL I****(30 de puncte)**

1. $a_1 = -1$ (5p)
2. $f(5) = f(6) = 0 \Rightarrow f(0) \cdot f(1) \cdot \dots \cdot f(6) = 0$ (5p)
3. $D = (3, \infty)$ (2p) $x = 4 \in D$ (3p)
4. $x \in \{0, 5\}$ (5p)
5. $m_d = 2 \Rightarrow m_{\text{paralela}} = 2 \Rightarrow 2x - y = 0$ (5p)
6. $\cos \alpha = \frac{3}{5}$ (5p)

SUBIECTUL al II-lea**(30 de puncte)**

1. a) $(2, 1, -1)$ verifică cele 3 ecuații $\Rightarrow m = 3$ (5p)
b) $\Delta = -5m + 15$ (3p) $m \in \{-5, 3\}$ (2p)
c) $\Delta = -5m + 15 = 40, \Delta_x = 0, \Delta_y = 120, \Delta_z = 40$ (4p) $x = 0, y = 3, z = 1$ (1p)
2. a) $S_1 = x_1 + x_2 + x_3 = -p, S_2 = x_1x_2 + x_1x_3 + x_2x_3 = 0, S_3 = x_1x_2x_3 = -1$ (5p)
b) $f:(x-1) \Leftrightarrow f(1) = 0 \Leftrightarrow p = -2$ (5p)
b) dacă $x_1, x_2, x_3 \in \mathbb{R} \Rightarrow x_i^3 = -px_i^2 - 3$ (3p) $x_1^3 + x_2^3 + x_3^3 = 5$ (2p)

SUBIECTUL al III-lea**(30 de puncte)**

1. a) $f'(x) = 1 - \frac{2}{x}$ (5p)
b) $f''(x) = \frac{2}{x^2} > 0, \forall x \in (0, \infty)$ (5p)
c) din tabelul de valori $\Rightarrow f(x) \geq 2 - \ln 4$ (5p)
2. a) $\int f(x) dx = \frac{x^2}{2} + 2 \ln x + C$ (5p)
b) $V = \pi \int_1^2 f^2(x) dx$ (2p) $V = \pi \int_1^2 \left(x + \frac{2}{x}\right)^2 dx = \frac{25\pi}{3}$ (3p)
c) $\int_1^2 f(x) \cdot (\ln x) dx = \int_1^2 x \ln x dx + \int_1^2 \frac{2}{x} \ln x dx = \ln^2 2 + 2 \ln 2 - \frac{3}{4}$ (5p)