

**(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)  
c) 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)