

INSPECTORATUL ȘCOLAR JUDEȚEAN CLUJ

Barem Matematică $M_mate-info$ **(oficiu 10 puncte)****SUBIECTUL I****(30 de puncte)**

- $(1+i)^{20} = (2i)^{10} = -2^{10}$ (5p)
- $x \in [3;4]$ (5p)
- $f(0) = f(-1) = 1 \Rightarrow f$ nu este injectivă (5p)
- $C_n^2 = 120, n \in \mathbb{N}, n \geq 2$ (2p) $n = 16$ (3p)
- $\cos(\vec{u}, \vec{v}) = \frac{\vec{u} \cdot \vec{v}}{\|\vec{u}\| \cdot \|\vec{v}\|}$ (2p) Unghiul este obtuz $\Leftrightarrow 2 - a < 0 \Rightarrow a > 2$ (3p)
- $1 - \operatorname{tg}^2 x = \operatorname{tg} x$ (2p) $\operatorname{tg} 2x = \frac{2 \operatorname{tg} x}{1 - \operatorname{tg}^2 x} = 2$ (3p)

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

- $\det M = -4m^2 + m - 1$ (5p)
 - $\det M = -4m^2 + m - 1 \neq 0, \forall m \in \mathbb{R} (\Delta < 0)$ (5p)
 - $A = \frac{1}{2} | -4m^2 + m - 1 | \geq \frac{15}{32}$ adev. pt. $\forall m \in \mathbb{R}$ (5p)
- $x_1 + x_2 + x_3 + x_4 - \frac{1}{x_1} - \frac{1}{x_2} - \frac{1}{x_3} - \frac{1}{x_4} = a - a = 0$ (5p)
 - $f: (x^2 - 1) \Leftrightarrow \left. \begin{array}{l} f(1) = 0 \\ f(-1) = 0 \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} 2 + 2a = 0 \\ 2 + 2a = 0 \end{array} \right. \Rightarrow 4 = 0$ fals (5p)
 - $x_i^3 - ax_i^2 - a + \frac{1}{x_i} = 0 \Rightarrow x_1^3 + x_2^3 + x_3^3 + x_4^3 = a^3 + 3a = 14$, pentru $a = 2$ (5p)

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

- $f'(x) = \frac{1}{1+x^2}$ (3p) $y - \frac{\pi}{4} = \frac{1}{2}(x-1)$ (2p)
 - $\lim_{x \rightarrow \infty} x^2 [f(x+1) - f(x)] \stackrel{L'H}{=} \lim_{x \rightarrow \infty} \frac{-2x^4 - x^3}{-2(x^2+1)(x^2+2x+2)} = 1$ (5p)
 - fie $g(x) = f(x) - x + \frac{x^3}{3} \Rightarrow g'(x) = \frac{x^4}{1+x^2} \geq 0; g(0) = 0 \Rightarrow g(x) < 0, \forall x \in (-\infty, 0)$ (5p)
- $F_1(x) = \int_0^x te^{-t} dt = 1 - (x+1) \cdot e^{-x}$ (5p)
 - $F_n'(x) = x^n \cdot e^{-x}, x > 0$ (2p) $F_n''(x) = x^{n-1} \cdot e^{-x} \cdot (n-x), x > 0 \Rightarrow$ punctul de inflexiune este $x = n$ (3p)
 - $F_2(x) = \int_0^x e^{-t} t^2 dt = -\frac{x^2}{e^x} - \frac{2x}{e^x} - \frac{2}{e^x} + 2$, deci limita cerută este egală cu 2 (5p)