

BAREM DE EVALUARE ȘI DE NOTARE**Varianta 36**

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SUBIECTUL I (30 de puncte)

1.	$\sqrt{36} - \sqrt{9} + \sqrt{81} - 3\sqrt[3]{64}$ $=0$	2p 3p
2.	$ 3x - 2 \leq 4; -\frac{2}{3} \leq x \leq 2, x \in \mathbb{Z}$ $A = \{0, 1, 2\}$	3p 2p
3.	$-2x + 1 = -2x^2 + 3x - 1;$ $2x^2 - 5x + 2 = 0$ $x_1 = \frac{1}{2}; x_2 = 2$	1p 2p 2p
4.	Condiții de existență: $\begin{cases} x > 0 \\ x - 2 > 0 \end{cases}; x \in (2, +\infty)$ Din proprietățile logaritmulor: $\log_2^{x(x-2)} = 3 \Rightarrow x^2 - 2x - 8 = 0; x_1 = -2; x_2 = 4;$ $-2 \notin (2, \infty) \Rightarrow S = \{4\}$	1p 3p 1p
5.	$\vec{a} = 3(2\vec{i} + 3\vec{j}) - 2(3\vec{i} - 2\vec{j})$ $\vec{a} = 13\vec{j}$	2p 3p
6.	$A_{\triangle ABC} = \frac{AB \cdot AC \cdot \sin BAC}{2}$ $A_{\triangle ABC} = 9$	2p 3p

SUBIECTUL al II-lea (30 de puncte)

1.	a)	$A + 3I_3 = O_3 \Rightarrow \begin{pmatrix} a & b & c \\ x & y & z \\ u & v & w \end{pmatrix} + \begin{pmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$	2p
		$\begin{pmatrix} a+3 & b & c \\ x & y+3 & z \\ u & v & w+3 \end{pmatrix} = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$	2p
		$a = -3, b = 0, c = 0; x = 0, y = -3, z = 0; u = 0, v = 0, w = -3.$	1p
	b)	$A^t = \begin{pmatrix} a & x & u \\ b & y & v \\ c & z & w \end{pmatrix}$	1p
		$B = A - A^t = \begin{pmatrix} 0 & b-x & c-u \\ x-b & 0 & z-v \\ u-c & v-z & 0 \end{pmatrix}$	2p
		$\det B = \begin{vmatrix} 0 & b-x & c-u \\ x-b & 0 & z-v \\ u-c & v-z & 0 \end{vmatrix} = (x-b)(v-z)(c-u) - (x-b)(v-z)(c-u) = 0.$	2p
	c)	$a = y = w = 0; b = c = x = z = u = v = 1 \Rightarrow A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$	2p
		$A^2 = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{pmatrix}$	3p
2.	a)	$a = 3, b = -1 \Rightarrow f = x^4 + 3x^3 - x^2 - 5x + 4$	1p
		$c = x^3 + 5x^2 + 9x + 13$	2p
		$r = 30$	2p
	b)	$x_1 = -1, x_2 = 1 \text{ rădăcini} \Rightarrow f(-1) = 0; f(1) = 0$	1p

	$f(-1) = (-1)^4 + a(-1)^3 + b(-1)^2 - 5(-1) + 4 = -a + b + 10$	2p
	$f(1) = (1)^4 + a(1)^3 + b(1)^2 - 5(1) + 4 = a + b$	2p
	$\Rightarrow \begin{cases} -a + b + 10 = 0 \\ a + b = 0 \end{cases} \Rightarrow a = 5; b = -5.$	
c)	$a = 3, b = -1 \Rightarrow f = x^4 + 3x^4 - x^2 - 5x + 4$	
	Din x_1, x_2, x_3, x_4 rădăcini, $f(x) = (x - x_1)(x - x_2)(x - x_3)(x - x_4) \Rightarrow$	2p
	$P = (1 - x_1)(1 - x_2)(1 - x_3)(1 - x_4) = f(1) = 2$	3p

SUBIECTUL al III-lea (30 de puncte)

1. a)	$\exists \lim_{x \rightarrow x_0} f(x) \Leftrightarrow \lim_{x \nearrow x_0} f(x) = \lim_{x \searrow x_0} f(x)$	1p
	$\lim_{x \nearrow -1} f(x) = \lim_{x \nearrow -1} \frac{x^2 + x - 6}{x + 1} = \infty$	3p
	$\lim_{x \searrow -1} f(x) = \lim_{x \searrow -1} \frac{x^2 + x - 6}{x + 1} = -\infty$	
	$\lim_{x \nearrow -1} f(x) \neq \lim_{x \searrow -1} f(x) \Rightarrow f \text{ nu are limită în } x = -1$	1p
b)	Ecuația asimptotei oblice: $y = mx + n$	1p
	$m = \lim_{x \rightarrow \infty} \frac{f(x)}{x} = \lim_{x \rightarrow \infty} \frac{x^2 + x - 6}{x(x + 1)} = 1$	2p
	$n = \lim_{x \rightarrow \infty} [f(x) - mx] = \lim_{x \rightarrow \infty} \frac{-6}{x + 1} = 0$	
	$m = 1; n = 0; \text{ecuația asimptotei : } y = x$	1p
		1p
c)	$f'(x) = \frac{x^2 + 2x + 7}{(x + 1)^2};$	1p
		2p

	$f''(x) = \frac{-12}{(x+1)^3}$ $x \in (-\infty, -1) \Rightarrow f''(x) > 0 \Rightarrow f = \text{funcție convexă}$ $x \in (-1, \infty) \Rightarrow f''(x) < 0 \Rightarrow f = \text{funcție concavă}$	1p 1p
2. a)	$\int_0^1 \frac{f(x)}{e^x} dx = \int_0^1 \sqrt{x^2 + 25} =$ $= \frac{\sqrt{26}}{2} + \frac{25}{2} \ln \frac{1+\sqrt{26}}{5}$	1p 4p
b)	$g(x) = \frac{f(x)}{e^x} = \sqrt{x^2 + 25}$ $V = \pi \int_0^1 g^2(x) dx =$ $= \pi \int_0^1 (x^2 + 25) dx = \frac{76\pi}{3}$	1p 2p 2p
c)	$\int_0^1 \sqrt{x^2 + 25} f(x) dx = \int_0^1 (x^2 + 25) e^x dx =$ $= (x^2 + 25) e^x \Big _0^1 - 2x e^x \Big _0^1 + 2 e^x \Big _0^1$ $= 26e - 27$	1p 2p 2p