

A-H Clasa a XI-a
Barem de corectare și notare
Subiectul 1

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| $\begin{pmatrix} 0 & 2 & 1 \\ 1 & 1 & 1 \\ 2 & 1 & 0 \\ 1 & 0 & 2 \end{pmatrix} + \begin{pmatrix} 1 & 1 & 1 \\ 2 & 0 & 1 \\ 0 & 2 & 1 \\ 1 & 1 & 1 \end{pmatrix} = \begin{pmatrix} 1 & 3 & 2 \\ 3 & 1 & 2 \\ 2 & 3 & 1 \\ 2 & 1 & 3 \end{pmatrix}$ | 3p |
| $\begin{pmatrix} 1 & 3 & 2 \\ 3 & 1 & 2 \\ 2 & 3 & 1 \\ 2 & 1 & 3 \end{pmatrix} \cdot \begin{pmatrix} 3 \\ 1 \\ 0 \end{pmatrix} = \begin{pmatrix} 6 \\ 10 \\ 9 \\ 7 \end{pmatrix}$ | 3p |
| Clasamentul este: 1. Echipa 2; 2. Echipa 3; 3. Echipa 4; 4. Echipa 1 | 1p |

Subiectul 2

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| a) $\det A(2) = 3$ | 1p |
| b) $A(x) \cdot A(y) = \begin{pmatrix} 1 - 3x - 3y - 3xy & -2y - 2x - 2xy \\ 6x + 6y + 6xy & 1 + 4x + 4y + 4xy \end{pmatrix} = A(x + y + xy), x, y \in \mathbb{R}$ | 3p |
| c) $A^2(x) = A(2x + x^2) = A((x + 1)^2 - 1), \forall x \in \mathbb{R}$ | 3p |

Subiectul 3

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| a) $\lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0} (x^2 + x + 1) = 1$ | 1p |
| $\lim_{\substack{x \rightarrow 0 \\ x > 0}} f(x) = \lim_{\substack{x \rightarrow 0 \\ x > 0}} \left(\frac{3x^2 + 2x - m}{x + 2} \right) = -\frac{m}{2}$ | 1p |
| f continuă în 0 $\Leftrightarrow \lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0} f(x) = f(0) = 1 \Rightarrow m = -2$ | 1p |
| b) $\lim_{x \rightarrow \infty} \frac{3x^2 + 2x - m}{x + 2} = +\infty \Rightarrow \nexists$ as. orizontală spre $+\infty$ la graficul funcției f | 1p |
| $\lim_{x \rightarrow \infty} \left(\frac{3x^2 + 2x - m}{x(x + 2)} \right) = 3; \lim_{x \rightarrow \infty} \left(\frac{3x^2 + 2x - m}{x + 2} - 3x \right) = -4 \Rightarrow$ ec. as. oblice $y = 3x - 4$ | 3p |

Subiectul 4

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|---|-----------|
| a) $\lim_{x \rightarrow \infty} f_1(x) = \lim_{x \rightarrow \infty} (\sqrt{x^2 + x} - x) = \lim_{x \rightarrow \infty} \frac{x^2 + x - x^2}{\sqrt{x^2 + x} + x} = \lim_{x \rightarrow \infty} \frac{x}{x \left(\sqrt{1 + \frac{1}{x}} + 1 \right)} = \frac{1}{2}$ | 2p |
| b) $\lim_{x \rightarrow -\infty} \frac{f_{2021}(x)}{f_{2022}(x)} = \lim_{x \rightarrow -\infty} \frac{-x \sqrt{1 + \frac{1}{x}} - 2021x}{-x \sqrt{1 + \frac{1}{x}} - 2022x} = \frac{2022}{2023}$ | 2p |
| c) $\lim_{x \rightarrow 1} \frac{f_{\sqrt{2}}(x)}{(x - 1)(x + 1)} = \lim_{x \rightarrow 1} \frac{\sqrt{x^2 + x} - x\sqrt{2}}{(x - 1)(x + 1)}$ | 1p |
| $\lim_{x \rightarrow 1} \frac{-x(x - 1)}{(x + 1)(x - 1)(\sqrt{x^2 + x} + x\sqrt{2})} = \lim_{x \rightarrow 1} \frac{-x}{(x + 1)(\sqrt{x^2 + x} + x\sqrt{2})} = -\frac{\sqrt{2}}{8}$ | 2p |