SUBIECTE

11 MAI 2025

SPECIALIZARE: BIOINGINERIE
SUBIECTE: MATEMATICĂ (întrebări 1-15)

VARIANTA A

	MATEMATICĂ
1.	Să se **calculeze** integrala : $I=\int_{-1}^{1}\sqrt{1-x^2}\,dx$ A. $I=0$ B. $I=\frac{\pi}{2}$ C. $I=\frac{\pi}{3}$ D. $I=\frac{\pi}{4}$ E. $I=\frac{\pi}{6}$

2.	Să se **calculeze** integrala : $I = \int_0^{\frac{\pi}{2}} \frac{1}{1+\sqrt{tgx}} dx$ A. $I = 0$ B. $I = \frac{\pi}{2}$ C. $I = \frac{\pi}{3}$ D. $I = \frac{\pi}{4}$ E. $I = \frac{\pi}{6}$
3.	Să se **calculeze** integrala : $I = \int_0^1 \frac{2x \cdot arctgx + \ln(1+x^2)}{1+x^2} dx$ A. $I = \pi \cdot \ln 2$ B. $I = \frac{\pi}{6} \cdot \ln 2$ C. $I = \frac{\pi}{2} \cdot \ln 2$ D. $I = \frac{\pi}{3} \cdot \ln 2$ E. $I = \frac{\pi}{4} \cdot \ln 2$

4.	**Fie** $I_n = \int_0^1 \frac{x^{n+1}}{x+3} dx$ **Atunci:** A. $\lim_{n\to\infty} (n \cdot I_n) = \frac{1}{2}$ B. $\lim_{n\to\infty} (n \cdot I_n) = \frac{1}{3}$ C. $\lim_{n\to\infty} (n \cdot I_n) = \frac{1}{4}$ D. $\lim_{n\to\infty} (n \cdot I_n) = \frac{1}{5}$ E. $\lim_{n\to\infty} (n \cdot I_n) = \frac{1}{6}$
5.	Să se **determine** numerele reale $\alpha.\beta \in R$ cu **proprietatea** că: $\alpha \cdot \begin{pmatrix} 1 & 2 \\ 2 & \alpha \end{pmatrix} + 3 \cdot \begin{pmatrix} \beta & 1 \\ 1 & \alpha \end{pmatrix} = \begin{pmatrix} 4 & 5 \\ 5 & 4 \end{pmatrix}$ A. $\alpha = \beta = 1$ B. $\alpha = \beta = -1$ C. $\alpha = \beta = -2$ D. $\alpha = \beta = 0$ E. $\alpha = \beta = 2$

6.	Se **consideră** : $A=\begin{pmatrix}1 & 0\\ 1 & 1\end{pmatrix}$. Să se **calculeze** matricea $A^n, n\geq 2$. A. $A^n=\begin{pmatrix}1 & 0\\ 2n & 1\end{pmatrix}$ B. $A^n=\begin{pmatrix}1 & 0\\ n & 1\end{pmatrix}$ C. $A^n=\begin{pmatrix}1 & 0\\ n+1 & 1\end{pmatrix}$ D. $A^n=\begin{pmatrix}1 & 0\\ n+2 & 1\end{pmatrix}$ E. $A^n=\begin{pmatrix}1 & 0\\ n^2 & 1\end{pmatrix}$.

7.	**Fie** $\overline{A} = \left(\begin{array}{cccc\|c} 1 & 2 & -1 & -2 & 1 \\ 0 & 4 & -3 & 5 & -1 \\ 2 & -2 & 0 & 3 & 1 \end{array}\right)$ **matricea extinsă** a unui **sistem** de ecuaţii liniare. Atunci **sistemul de ecuaţii liniare** este de **forma** : A. $\begin{cases} x+2y-z-t=1 \\ 4y-3z+5t=-1 \\ 2x-2y-3t=1 \end{cases}$ B. $\begin{cases} x+2y-t=1 \\ 4y-3z+5t=-1 \\ 2x-2y+3t=1 \end{cases}$ C. $\begin{cases} x+2y-z-2t=1 \\ 4y-3z+5t=-1 \\ 2x-2y+3t=1 \end{cases}$ D. $\begin{cases} x+2y-z-t=1 \\ 4y-3z+5t=-1 \\ 2x-2y=1 \end{cases}$ E. $\begin{cases} x+2y-z=1 \\ 4y-3z+5t=-1 . \\ 2x-2y+3t=1 \end{cases}$

8.	Se **consideră** : $A=\begin{pmatrix}0 & 2 & 3\\ 1 & -1 & 0\\ -1 & 2 & 1\end{pmatrix}$. Să se **calculeze** A^{-1}. A. $A^{-1}=\begin{pmatrix}1 & 4 & 3\\ -1 & 3 & 3\\ 1 & -2 & -2\end{pmatrix}$ B. $A^{-1}=\begin{pmatrix}-1 & 4 & 3\\ 1 & 3 & 3\\ 1 & -2 & -2\end{pmatrix}$ C. $A^{-1}=\begin{pmatrix}-1 & 4 & 3\\ -1 & 3 & 3\\ 1 & -2 & -2\end{pmatrix}$ D. $A^{-1}=\begin{pmatrix}-1 & 4 & 3\\ -1 & 3 & 3\\ 1 & 2 & -2\end{pmatrix}$ E. $A^{-1}=\begin{pmatrix}-1 & 4 & 3\\ -1 & 3 & 3\\ 1 & -2 & 2\end{pmatrix}$
9.	Să se **rezolve** sistemul **:** $\begin{cases}2A-B=\begin{pmatrix}1 & 0\\ 3 & 2\end{pmatrix}\\ A-2B=\begin{pmatrix}-7 & -3\\ 0 & 4\end{pmatrix}\end{cases}$. A. $A=\begin{pmatrix}3 & -1\\ 2 & 0\end{pmatrix}, B=\begin{pmatrix}5 & 2\\ 1 & -2\end{pmatrix}$ B. $A=\begin{pmatrix}3 & 1\\ 2 & 0\end{pmatrix}, B=\begin{pmatrix}5 & 2\\ 1 & -2\end{pmatrix}$ C. $A=\begin{pmatrix}3 & 1\\ 2 & 0\end{pmatrix}, B=\begin{pmatrix}5 & 2\\ 1 & 2\end{pmatrix}$ D. $A=\begin{pmatrix}3 & 1\\ 2 & 0\end{pmatrix}, B=\begin{pmatrix}5 & -2\\ 1 & -2\end{pmatrix}$ E. $A=\begin{pmatrix}-3 & 1\\ 2 & 0\end{pmatrix}, B=\begin{pmatrix}-5 & 2\\ 1 & -2\end{pmatrix}$.

10.	**Rezolvați** ecuația: $\begin{vmatrix} 3x & x+2 \\ -4 & -2 \end{vmatrix} = 0$. A. $x = 0$ B. $x = 1$ C. $x = 2$ D. $x = 4$ E. $x = 3$.
11.	**Fie** : $A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{pmatrix}, I_3 = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}, O_3 = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$. **Atunci:** A. $A^2 - 4 \cdot A + 4 \cdot I_3 = O_3$ B. $A^2 - 3 \cdot A + 4 \cdot I_3 = O_3$ C. $A^2 - 5 \cdot A + 4 \cdot I_3 = O_3$ D. $A^2 - 2 \cdot A + 4 \cdot I_3 = O_3$ E. $A^2 - A + 4 \cdot I_3 = O_3$.

12.	**Fie** şirul : $I_n = \int_0^1 \frac{x^n}{x+2020} dx, (\forall) n \in N^*$. **Atunci** : A. $I_{n+1} + 2020 I_n = \frac{1}{-n+1}$ B. $I_{n+1} + 2020 I_n = \frac{1}{n-1}$ C. $I_{n+1} + 2020 I_n = \frac{1}{n+1}$ D. $I_{n+1} + 2020 I_n = \frac{1}{2n+1}$ E. $I_{n+1} + 2020 I_n = \frac{1}{n+2}$.
13.	**Fie** $f(x) = \sqrt{x+2}$. Atunci $f'(8)$ **are valoarea** : A. $f'(8) = 2$ B. $f'(8) = -2$ C. $f'(8) = \frac{1}{2\sqrt{10}}$ D. $f'(8) = 0$ E. $f'(8) = -1$.

14.	**Fie** $f:R\to R, f(x)=7x^3-5x^2+x+1$. Să se **calculeze** : $l=\lim\limits_{x\to\infty}\dfrac{xf'(x)}{f(x)}$. A. $l=0$ B. $l=1$ C. $l=3$ D. $l=\infty$ E. $l=2$.
15.	Să se **calculeze** : $l=\lim\limits_{x\to-\infty}\dfrac{(x+1)(x+2)}{3x^3+2x-2020}$. A. $l=0$ B. $l=e^2$ C. $l=e^3$ D. $l=e^4$ E. $l=-1$.