Colegiul National ION NECULCE

Test de transfer clasa a 10-a februarie 2026

Subiectul I (40p)

1. Stiind ca $\log_3 2 = a$, aratati ca $\log_{16} 24 = \frac{1+3a}{4a}$.
2. Sa se determine Re z , Im z si $|z|$daca :
   a) $z=\left(\frac{1-2i}{1+i}\right)^2 + \left(\frac{1+2i}{1-i}\right)^2$
   b) $z= i^7 + i^{18} + i^{35} + i^{97} + i^{100} + (-i)^7 + (-i)^{15} + (-i)^{35} + (-i)^{97}$.
3. Calculati : $3^{2-\log_3 10} - 4^{1-\log_4 5} + 6^{\log_6 9-1}$

Subiectul II (50p)

4. Rezolvati ecuatiile urmatoare :
   a) $\sqrt{5x} - \sqrt{x-1} = \sqrt{3x+1}$
   b) $\left(\frac{9}{4}\right)^{3x+1} \cdot \sqrt{\left(\frac{8}{27}\right)^{6x}} = \frac{3}{2}$
   c) $36^x + 7 \cdot 2^x \cdot 3^x - 78 = 0$
   d) $\log_{0,(3)}(3x^2 - 19x + 27) = -3$
   e) $\lg(x^2 - 6x + 5) - \lg(3 - x) = \lg 3$

Nota. Se acorda 10 puncte din oficiu. Timp de lucru 60 minute. Fiecare cerinta 10 puncte.

Barem clasa a 10-a

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Subiectul I

1. $\log_{10} 24 = \dfrac{\log_3 24}{\log_3 16} = \dfrac{\log_3(2^3 \cdot 3)}{4\log_3 2} = \dfrac{1+3a}{4a}$.

2. a) $z = \left(\dfrac{(1-2i)(1-i)}{1-i^2}\right)^2 + \left(\dfrac{(1+2i)(1+i)}{1-i^2}\right)^2 =$

$= \left(\dfrac{1-i-2i-2}{2}\right)^2 + \left(\dfrac{1+i+2i-2}{2}\right)^2 = \dfrac{(-1-3i)^2}{4} + \dfrac{(-1+3i)^2}{4} =$

$= \dfrac{1+\cancel{6i}-9+1-\cancel{6i}-9}{4} = \dfrac{-16}{4} = -4$

$\operatorname{Re} z = -4$ $\quad |z| = 4$

$\operatorname{Im} z = 0$

b) $z = \cancel{i^7} + i^{18} + \cancel{i^{35}} + \cancel{i^{97}} + i^{100} - \cancel{i^7} - i^{15} - \cancel{i^{35}} - \cancel{i^{97}} =$

$= i^{16} \cdot i^2 + 1 - i^{12} \cdot i^3 =$

$= -1 + 1 - (-i) = i$

$\operatorname{Re} z = 0 \quad \operatorname{Im} z = 1 \quad |z| = 1$

3. $\dfrac{3^2}{3^{\log_3 10}} - \dfrac{4^1}{4^{\log_4 5}} + \dfrac{6^{\log_6 9}}{6^1} = \dfrac{\frac{3}{9}}{10} - \dfrac{\frac{6}{4}}{5} + \dfrac{\frac{5}{9}}{6} =$

$= \dfrac{27-24+45}{30} = \dfrac{48}{30} \overset{16}{=} \dfrac{8}{5}$.

II 4 a) $5x \geq 0$

$x-1 \geq 0$

$3x+1 \geq 0$

$$\sqrt{5x} = \sqrt{x-1} + \sqrt{3x+1} \quad \uparrow^2$$

$$5x = x - \cancel{1} + 2\sqrt{x-1} \cdot \sqrt{3x+1} + 3x + \cancel{1}$$

$$5x = 5x + 2\sqrt{x-1} \cdot \sqrt{3x+1}$$

$$0 = 2\sqrt{x-1} \cdot \sqrt{3x+1}$$

$x = 1$ soluție

$x = -\frac{1}{3}$ nu e soluție

b) $$\left(\frac{3}{2}\right)^{6x+2} \cdot \left(\frac{2}{3}\right)^{\frac{18x}{2}} = \frac{3}{2}$$

$$\left(\frac{3}{2}\right)^{6x+2} \cdot \left(\frac{3}{2}\right)^{-9x} = \frac{3}{2}$$

$$\left(\frac{3}{2}\right)^{-3x+2} = \frac{3}{2} \Rightarrow -3x+2 = 1 \Rightarrow x = \frac{1}{3}.$$

c) $6^x = t > 0$. $\quad t^2 + 7t - 78 = 0$ $\quad t_1 = 6$

$\Delta = 49 + 312 = 361 = 19^2$ $\quad t_2 = -13 < 0.$

$6^x = 6 \Rightarrow x = 1.$

d) CE: $3x^2 - 19x + 27 > 0.$

$$\log_{\frac{1}{3}}(3x^2 - 19x + 27) = \log_{\frac{1}{3}}\left(\frac{1}{3}\right)^{-3}$$

$$3x^2 - 19x + 27 = 27 \Rightarrow 3x^2 - 19x = 0 <$$

$x = 0$

$x = \frac{19}{3}$ soluții

e) CE $\begin{cases} x^2 - 6x + 5 > 0. \\ 3 - x > 0. \end{cases}$

$$\lg \frac{x^2-6x+5}{3-x} = \lg 3 \qquad \frac{x^2-6x+5}{3-x} = 3$$

$$x^2 - 6x + 5 = 9 - 3x$$

$$x^2 - 3x - 4 = 0$$

$x = -1$ soluție

$x = 4$ nu e soluție

Colegiul National ION NECULCE

Test de transfer clasa a 11-a februarie 2026

Subiectul I (40p)

1. Se considera matricea $A(a) = \begin{pmatrix} a+1 & 0 & 0 \\ 0 & 1 & \ln(a+1) \\ 0 & 0 & 1 \end{pmatrix}$, unde a este un parametru real pozitiv.
   a) Calculati det A((1))
   b) Demonstrati ca $A(a) \cdot A(b) = A(ab + a + b)$, pentru orice numere reale pozitive a si b.
   c) Determinati numarul real pozitiv a pentru care $A(a) \cdot A(a) \cdot A(a) = A(7)$.

2. Sa se afle matricea X daca :

$$\begin{pmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \end{pmatrix} \cdot X = \begin{pmatrix} 0 & 2 \\ 2 & 1 \end{pmatrix}$$

Subiectul II (50p)

3. Calculati limitele urmatoare :
   a) a) $\lim\limits_{x\to 0} \frac{\ln(1+x^3)}{x^4+x^3} =$

   b) $\lim\limits_{x\to 3} \frac{x^2-4x+3}{x^2-9} =$

   c) $\lim\limits_{x\to\infty} \left(x\sqrt{3} - \sqrt{3x^2+4x+1}\right) =$

4. Determinati asimptotele functiilor urmatoare :

   $f : R / \{2\} \to R$, $f(x) = \frac{\sqrt{x^2+3}}{x-2}$

5. Sa se afle parametrii reali a si b pentru care functia urmatoare este continua in punctul specificat, anume x = 0.

   f: $R \to R$

$$f(x) = \begin{cases} \dfrac{\sin ax}{bx} & , x < 0 \\ \dfrac{e^{ax}-1}{6x} & , x > 0 \\ \dfrac{2}{3} & , x = 0 \end{cases}$$

Nota. Se acorda 10 puncte din oficiu. Timp de lucru 60 minute. Fiecare cerinta 10 puncte.

BAREM CLASA 11 - TRANSFER

Subiectul I (40p)

1) a) $A(1)=\begin{pmatrix} 2 & 0 & 0 \\ 0 & 1 & \ln 2 \\ 0 & 0 & 1 \end{pmatrix}$ (2p)

$\det A(1) = 2+0+0-(0+0+0)=2$ (8p)

b.) $A(a)\cdot A(b)=\begin{pmatrix} a+1 & 0 & 0 \\ 0 & 1 & \ln(a+1) \\ 0 & 0 & 1 \end{pmatrix}\cdot\begin{pmatrix} b+1 & 0 & 0 \\ 0 & 1 & \ln(b+1) \\ 0 & 0 & 1 \end{pmatrix}=$ (2p)

$=\begin{pmatrix} (a+1)(b+1) & 0 & 0 \\ 0 & 1 & \ln(a+1)+\ln(b+1) \\ 0 & 0 & 1 \end{pmatrix}=$ (4p)

$=\begin{pmatrix} ab+a+b+1 & 0 & 0 \\ 0 & 1 & \ln(ab+a+b+1) \\ 0 & 0 & 1 \end{pmatrix}=$ (2p)

$= A(ab+a+b)$ (2p)

c.) $A(a)\cdot A(a) \overset{b)}{=} A(a^2+2a)$ (2p)

$A(a)\cdot A(a)\cdot A(a) = A(a(a^2+2a)+a^2+2a+a)=$ (2p)

$=A(a^3+3a^2+3a)$ (1p)

$A(a^3+3a^2+3a)=A(7) \Rightarrow a^3+3a^2+3a=7$ (2p)

$(a+1)^3=8 \Rightarrow a+1=2 \Rightarrow a=1$ (3p)

2) Fie $X=\begin{pmatrix} a & b \\ c & d \\ e & f \end{pmatrix}$ (2p)

$\begin{pmatrix} 1 & -1 & 0 \\ 0 & 1 & 1 \end{pmatrix}\cdot\begin{pmatrix} a & b \\ c & d \\ e & f \end{pmatrix}=\begin{pmatrix} a-c & b-d \\ c+e & d+f \end{pmatrix}=\begin{pmatrix} 0 & 2 \\ 2 & 1 \end{pmatrix}$ (3p)

$$\begin{cases} a-c=0 & \Rightarrow c=a \\ b-d=2 & \Rightarrow d=b-2 \\ c+e=2 & \Rightarrow e=2-a \\ d+f=1 & \Rightarrow f=3-b \end{cases} \qquad (4p)$$

$$X=\begin{pmatrix} a & b \\ a & b-2 \\ 2-a & 3-b \end{pmatrix} \quad \forall a,b\in\mathbb{R} \qquad (1p)$$

Subiectul II (50p)

3. a) $\lim\limits_{x\to 0}\dfrac{\ln(1+x^3)}{x^4+x^3} \overset{\frac{0}{0}}{=} \lim\limits_{x\to 0}\underbrace{\dfrac{\ln(1+x^3)}{x^3}}_{\downarrow 1}\cdot\dfrac{x^3}{x^4+x^3} = (3p)$ (2p)

$= \lim\limits_{x\to 0}\dfrac{\cancel{x^3}}{\cancel{x^3}(x+1)} \;(2p) = \lim\limits_{x\to 0}\dfrac{1}{x+1} = 1 \quad (3p)$

b) $\lim\limits_{x\to 3}\dfrac{x^2-4x+3}{x^2-9} \overset{\frac{0}{0}}{=} \lim\limits_{x\to 3}\dfrac{(x-1)\cancel{(x-3)}}{\cancel{(x-3)}(x+3)} = (5p)$ (2p)

$= \lim\limits_{x\to 3}\dfrac{x-1}{x+3} \;(2p) = \dfrac{2}{6} = \dfrac{1}{3} \quad (1p)$

c) $\lim\limits_{x\to\infty}\left(x\sqrt{3}-\sqrt{3x^2+4x+1}\right) \overset{\infty-\infty}{=\!=} \quad (2p)$

$= \lim\limits_{x\to\infty}\dfrac{3x^2-(3x^2+4x+1)}{x\sqrt{3}+\sqrt{3x^2+4x+1}} = \quad (2p)$

$= \lim\limits_{x\to\infty}\dfrac{-4x-1}{x\sqrt{3}+\sqrt{3x^2+4x+1}} = \quad (2p)$

$= \lim\limits_{x\to\infty}\dfrac{x\left(-4-\frac{1}{x}\right)}{x\left(\sqrt{3}+\sqrt{3+\frac{4}{x}+\frac{1}{x^2}}\right)} \overset{(2p)}{=} \dfrac{-4\sqrt{3}}{2\cdot 3} = -\dfrac{2\sqrt{3}}{3} \quad (2p)$

4.) $\lim_{x\to+\infty} f(x) \overset{\frac{\infty}{\infty}}{=} 1$ (1p) (1p) $\Rightarrow y=1$ este asimptotă orizontală spre $+\infty$ (2p)

$\lim_{x\to-\infty} f(x) \overset{\frac{\infty}{\infty}}{=} -1$ (1p) (1p) $\Rightarrow y=-1$ este asimptotă orizontală spre $-\infty$ (2p)

$l_s(2) = -\infty$ (1p)

$l_d(2) = +\infty$ (1p) $\Rightarrow x=2$ este asimptotă verticală spre $\pm\infty$. (2p)

5.) f e continuă în $x=0 \Leftrightarrow l_s(0) = l_d(0) = f(0)$ (2p)

$l_s(0) = \frac{a}{b}$ (2p)

$l_d(0) = \frac{a}{6}$ (2p) $\Rightarrow \frac{a}{b} = \frac{a}{6} = \frac{2}{3}$. (1p)

$f(0) = \frac{2}{3}$ (1p)

$a = 4$

$b = 6$ (2p)