

Popuniti odmah!

IME I PREZIME: BERNARDO KOTLAR

BROJ INDEKSA:

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DATUM: 17.3.

VRIJEME: OD

DO

MATEMATIKA 1: Trajanje 100 minuta. Zabranjen je razgovor sa drugim studentima. ZADATKE RIJEŠAVATE JEDNOSTRANO NA PAPIRE KOJE DOBIJETE OD NASTAVNIKA.

xoox  
Broj ↓  
bodova

1. Koju relaciju zadovoljava inverz matrice? Provjeriti tu relaciju za inverz matrice (ako postoji)

$$A = \begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 2 & 3 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 2 \end{bmatrix}$$

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2. Pronaći sve kompleksne brojeve  $z$  takve da je  $z^4 + |3i + 4| = \frac{5}{i^{31}}$ .

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3. Odrediti domenu i sve asimptote funkcije  $f(x) = \ln\left(\frac{x}{1-x}\right)$ .

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4. Ispitati domenu, periodičnost, (ne)parnost i prvu derivaciju funkcije  $g(x) = \sin(\cos(3x))$ .

5. Na temelju ispitivanja toka funkcije napraviti skicu grafa funkcije  $f$  iz zadatka 3.

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$$\left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 2 & 3 & 0 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 2 & 0 & 0 & 0 & 1 \end{array} \right) \sim \left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 2 & 3 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 2 & 0 & 0 & 0 & 1 \end{array} \right) \begin{array}{l} \cdot (-1) \\ \leftarrow \end{array}$$

$$\left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 2 & 3 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 & 1 \end{array} \right) \begin{array}{l} \leftarrow \\ \cdot (-2) \end{array} \sim \left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 3 & 0 & 0 & 1 & -2 & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 & 1 \end{array} \right) \begin{array}{l} \leftarrow \\ \cdot (-3) \\ \cdot (-1) \end{array}$$

$$\left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & 2 & 0 & 0 & -1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & \frac{1}{3} & -\frac{2}{3} & 0 \\ 0 & 0 & 0 & 1 & -1 & 0 & 0 & 1 \end{array} \right)$$

$$A \cdot A^{-1} = \left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 1 & 2 & 0 & 0 & -1 \\ 0 & 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & \frac{1}{3} & -\frac{2}{3} & 0 \\ 1 & 0 & 0 & 2 & -1 & 0 & 0 & 1 \end{array} \right) = \left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{array} \right) \quad A \cdot A^{-1} = I$$

$$\begin{pmatrix} 2+0+0-1, & 0+0+0+0, & 0+0+0+0, & -1+0+0+1 \\ 0+0+0+0, & 0+0+1+0, & 0+2-2+0, & 0+0+0+0 \\ 0+0+0+0, & 0+0+0+0, & 0+1+0+0, & 0+0+0+0 \\ 2+0+0-2, & 0+0+0+0, & 0+0+0+0, & -1+0+0+1 \end{pmatrix}$$

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$$z^4 + |3i + 4| = \frac{5}{i^{37}}$$

$$z^4 = \frac{5}{-i} - |\sqrt{9+16}|$$

$$z^4 = \frac{5}{-i} \cdot \frac{i}{i} - |\sqrt{25}|$$

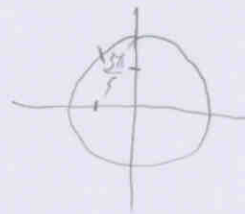
$$z^4 = \frac{5i}{1} - 5$$

$$z^4 = 5i - 5 \quad \checkmark$$

$$r = \sqrt{(5)^2 + (5)^2}$$

$$= \sqrt{50}$$

$$= 5\sqrt{2} \quad \checkmark$$



$$\tan \rho = \frac{5}{-5} = -1$$

$$\rho = \frac{3\pi}{4} \quad \checkmark$$

$$z = \sqrt[4]{5\sqrt{2}} \cdot \left( \cos \frac{3\pi}{4} + i \sin \frac{3\pi}{4} \right) \quad \checkmark$$

$$k=0$$

$$z_0 = 1.972 \cdot \left( \cos \frac{3\pi + 0}{76} + i \sin \frac{3\pi + 0}{76} \right) \quad \checkmark$$

$$k=1$$

$$z_1 = 1.972 \cdot \left( \cos \frac{3\pi + 2\pi}{76} + i \sin \frac{3\pi + 2\pi}{76} \right) \quad \checkmark$$

$$= 1.972 \cdot \left( \cos \frac{5\pi}{76} + i \sin \frac{5\pi}{76} \right)$$

$$k=2$$

$$z_2 = 1.972 \cdot \left( \cos \frac{3\pi + 4\pi}{76} + i \sin \frac{3\pi + 4\pi}{76} \right) \quad \checkmark$$

$$= 1.972 \cdot \left( \cos \frac{7\pi}{76} + i \sin \frac{7\pi}{76} \right)$$

$k=3$

$$z_4 = 7.972 \cdot \left( \cos \frac{3\pi + 6\pi}{76} + i \sin \frac{3\pi + 6\pi}{76} \right)$$

$$= 7.972 \cdot \left( \cos \frac{9\pi}{76} + i \sin \frac{9\pi}{76} \right)$$

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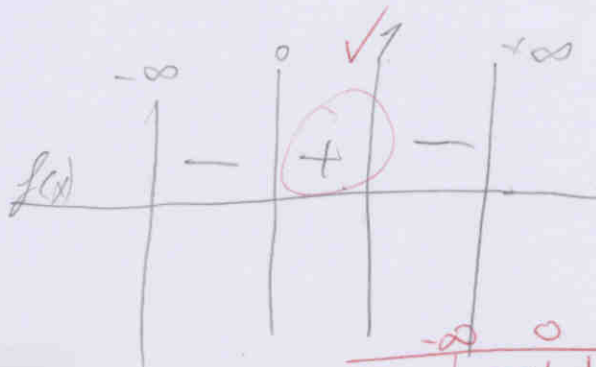
3.

$$f(x) = \ln \left( \frac{x}{7-x} \right)$$

$7-x > 0 \quad x \neq 0$

$-x = -7$

$x = 7$



$Df(x) \in (0, 7)$

	$-\infty$	$0$	$7$	$+\infty$
$x$	-	+	+	+
$7-x$	+	+	-	-
$\frac{x}{7-x}$	-	+	+	+

V. A

$$\lim_{x \rightarrow \infty} \ln \left( \frac{x}{7-x} \right) = \ln \left( \frac{7}{0} \right) = \ln(\infty) = \infty$$

V. A za  $x=0$   
 $\lim_{x \rightarrow 0} \ln \left( \frac{x}{7-x} \right) = ?$

H. A.

$$\lim_{x \rightarrow \infty} \ln \left( \frac{x}{7-x} \right) = \ln \left( \frac{1}{-7} \right) = \ln(-7) \quad \times$$

✗

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KOSE ASIMPTOTE LEMA

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$$g(x) = \sin(\cos(3x))$$

$$3x > 0$$

~~0~~

$$g'(x) = \sin(\cos(3x))' \cdot \cos(3x)$$

$$x = 0$$

$$= \cos(\cos(3x)) \cdot -\sin(3x) \cdot 3$$

$$D_{g'}(x) \quad x \in \setminus \{0\}$$

$$= \cos^2 3x \cdot -\sin(3x)$$



$$(\cos(3x))' = -\sin(3x) \cdot (3x)'$$