

Popuniti odmah!

IME I PREZIME: NIKOLINA KOMJENOVIC

BROJ INDEKSA: 0139

DATUM: 21.2.2012. VRIJEME: OD 14:00 DO

MATEMATIKA 1: Trajanje 120 minuta. Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata.

6  
Broj ↓  
bodova  
15+5

1. Gaussovom metodom riješiti matricni sustav (a zatim matricnim množenjem provjeriti rješenje):

$$\begin{bmatrix} 4 & -1 & 1 & 2 \\ 2 & 1 & 0 & -3 \\ 1 & -1 & 2 & 1 \\ 2 & 1 & 1 & -4 \end{bmatrix} \begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix} = \begin{bmatrix} 14 \\ 2 \\ 3 \\ 0 \end{bmatrix}$$

2. Odrediti domenu, derivaciju i sve asimptote funkcije  $f(x) = \ln(3 + 2x - x^2)$

5+5+5+5

3. Istražiti konvergenciju reda:  $\sum_{n=1}^{\infty} \left(\frac{3+2n}{3n+3}\right)^{n^2}$

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4. Istražiti globalni minimum funkcije  $g(x) = \arctan(x^2)$ .

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5. Na temelju ispitivanja toka funkcije napraviti skicu grafa funkcije  $h(x) = \frac{x^2-1}{x^2-4}$ .

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1.)

$$\begin{bmatrix} 4 & -1 & 1 & 2 & | & 14 \\ 2 & 1 & 0 & -3 & | & 2 \\ 1 & -1 & 2 & 1 & | & 3 \\ 2 & 1 & 1 & -4 & | & 0 \end{bmatrix} \xrightarrow{\text{I} \cdot (-1) + \text{II}} \begin{bmatrix} 4 & -1 & 1 & 2 & | & 14 \\ 2 & 1 & 0 & -3 & | & 2 \\ -3 & 0 & 1 & -1 & | & -11 \\ 2 & 1 & 1 & -4 & | & 0 \end{bmatrix} \xrightarrow{\text{II} \cdot (-1) + \text{I}} \begin{bmatrix} 1 & -1 & 2 & 1 & | & 3 \\ 2 & 1 & 0 & -3 & | & 2 \\ -3 & 0 & 1 & -1 & | & -11 \\ 2 & 1 & 1 & -4 & | & 0 \end{bmatrix} \xrightarrow{\text{II} \cdot 1 + \text{IV}} \begin{bmatrix} 1 & -1 & 2 & 1 & | & 3 \\ 2 & 1 & 0 & -3 & | & 2 \\ -3 & 0 & 1 & -1 & | & -11 \\ 0 & 0 & -1 & 1 & | & 2 \end{bmatrix}$$
$$\begin{bmatrix} 4 & -1 & 1 & 2 \\ 2 & 1 & 0 & -3 \\ 1 & -1 & 2 & 1 \\ 2 & 1 & 1 & -4 \end{bmatrix} \cdot \begin{bmatrix} 1 & -1 & 2 & 1 \\ 2 & 1 & 0 & -3 \\ -3 & 0 & 1 & -1 \\ 0 & 0 & -1 & 1 \end{bmatrix} = \begin{bmatrix} 4 \cdot 1 + 4 \cdot 2 + 4 \cdot (-3) + 4 \cdot 0 \end{bmatrix}$$

②  $f(x) = \ln(3+2x-x^2)$

$3+2x-x^2 \geq 0$

$a = -1$   
 $b = 2$   
 $c = 3$

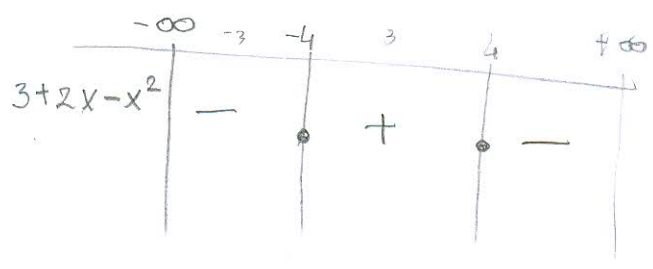
$x_{1,2} = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$x_{1,2} = \frac{-2 \pm \sqrt{4 - 4 \cdot (-1) \cdot 3}}{-2}$

$x_{1,2} = \frac{-2 \pm \sqrt{4+12}}{-2}$

$x_{1,2} = \frac{-2 \pm 4}{-2}$

$x_1 = 4$   
 $x_2 = -4$



$D_f(x) x \in [-4, 4]$

$f(x) = \ln(3+2x-x^2)$

$f'(x) = \frac{1}{3+2x-x^2} \cdot (3+2x-x^2)'$

$f'(x) = \frac{1}{3+2x-x^2} \cdot (3+2 \cdot 1 - 2x)$

$f'(x) = \frac{1}{3+2x-x^2} \cdot (5-2x)$

$f'(x) = \frac{5-2x}{3+2x-x^2}$

$5-2x = 0$

$-2x = -5 \quad | : (-2)$

$x = \frac{5}{2} \quad (\frac{5}{2}, 0) \text{ station. point}$

ASIMPTOTE:

V.A.  $\lim_{x \rightarrow 1} \frac{5-2x}{3+2x-x^2} = \lim_{x \rightarrow 1} \frac{5-2 \cdot 1}{3+2 \cdot 1 - (1)^2} = \frac{3}{4}$

$\lim_{x \rightarrow -1} \frac{5-2x}{3+2x-x^2} = \lim_{x \rightarrow -1} \frac{5-2 \cdot (-1)}{3+2 \cdot (-1) - (-1)^2} = \frac{7}{0} = \infty$

H.A.  $\lim_{x \rightarrow \infty} \frac{5-2x}{3+2x-x^2} = \lim_{x \rightarrow \infty} \frac{\frac{5}{x^2} - \frac{2x}{x^2}}{\frac{3}{x^2} + \frac{2x}{x^2} - \frac{x^2}{x^2}} = \frac{0}{-1} = 0$

V.A.  $y = kx + e$

$$(5) h(x) = \frac{x^2-1}{x^2-4}$$

MULTIČŔKE

$$x^2-1=0$$

$$x^2=1/\sqrt{\quad}$$

$$x=\pm 1 \quad N_1(1,0)$$

$$N_2(-1,0)$$

DOMENA

$$x^2-4 \neq 0$$

$$x^2=4/\sqrt{\quad}$$

$$x=\pm 2 \quad D(h(x)) \in \mathbb{R} \setminus \{-2, 2\}$$



PARNOST/NEPARNOST

$$h(x) = \frac{x^2-1}{x^2-4}$$

$$h(-x) = \frac{(-x)^2-1}{(-x)^2-4} = \frac{x^2-1}{x^2-4}$$

FUNKCIJA JE PARNÁ  
 $h(x) = h(-x)$

	$-\infty$	$-1$	$-4$	$+\infty$
$x^2-1$	+	0	+	+
$x^2-4$	+	+	0	+

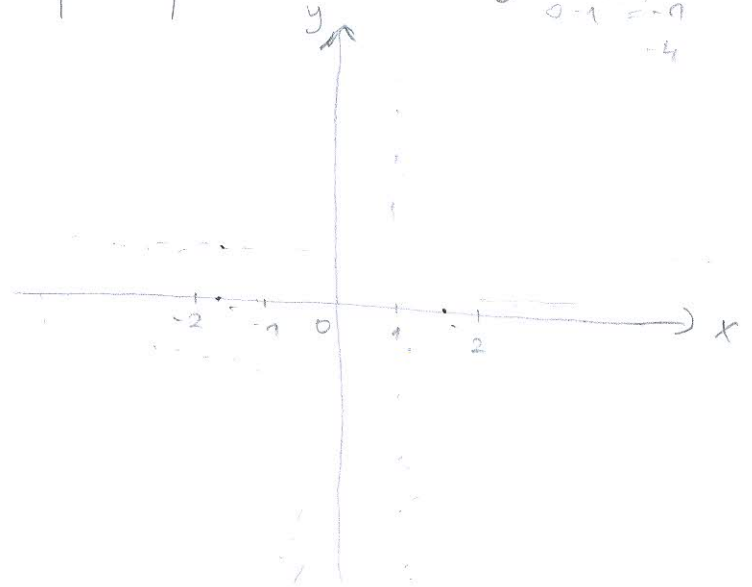
PERIODIČNÁ, NEMA JER NIJE TRIGONOMETRIJSKA FUNKCIJA

$$f(x)=0 \Rightarrow x^2-1=0 \Rightarrow x=\pm 1$$

ASIMPTOTE!

V.A.  $\lim_{x \rightarrow 1} \frac{x^2-1}{x^2-4} = \lim_{x \rightarrow 1} \frac{1-1}{1-4} = \frac{0}{-3} = 0$

H.A.  $\lim_{x \rightarrow \infty} \frac{x^2-1}{x^2-4} = \lim_{x \rightarrow \infty} \frac{x^2/x^2 - 1/x^2}{x^2/x^2 - 4/x^2} = \frac{1-0}{1-0} = 1$



DERIVACIJA!

$$h(x) = \frac{x^2-1}{x^2-4}$$

$$h'(x) = \frac{(x^2-1)' \cdot (x^2-4) - (x^2-1) \cdot (x^2-4)'}{(x^2-4)^2} =$$

$$h'(x) = \frac{(2x-1)(x^2-4) - (x^2-1)(2x-4)}{(x^2-4)^2}$$

$$h'(x) = \frac{2x-1 - x^2+1(2x-4)}{x^2-4}$$

$$h'(x) = \frac{2x-1-x^2+2x-4}{x^2-4}$$

$$h'(x) = \frac{3-x^2}{x^2-4} //$$

$$h''(x) = \frac{3-x^2}{x^2-4} =$$

$$h''(x) = \frac{(3-x^2)' \cdot (x^2-4) - (3-x^2) \cdot (x^2-4)'}{(x^2-4)^2}$$

$$h''(x) = \frac{(3-2x)(x^2-4) - (3-x^2) \cdot (2x-4)}{(x^2-4)^2}$$

$$h''(x) = \frac{3-2x-3+x^2(2x-4)}{(x^2-4)}$$

$$h''(x) = \frac{-2x+2x^3-4x^2}{(x^2-4)}$$

$$3-x^2=0$$

$$-x^2=-3/:(-1)$$

$$x^2=3/\sqrt{\quad}$$

$$x=\pm\sqrt{3}$$

$$2,173$$

TOČKE

INFLEKSIJE

$$(+\sqrt{3}, 0), (-\sqrt{3}, 0)$$



$$4. f(x) = \arctan(x^2)$$

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IME I PREZIME: **ADRIANO VIPOTNIK**

BROJ INDEKSA: **17-2-0138-2011**

DATUM: 21.2.2012. VRIJEME: OD

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