Popuniti odmah!

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MATEMATIKA 1: Trajanje 120 minuta. Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. 7

Broj ↓ bodova

1. Odrediti točke infleksije funkcije $f(x) = \ln(x^2+1)$. 20
2. Odrediti i ispitati sve asimptote funkcije $g(x) = \dfrac{x}{\ln x}$. 5+5+5+5
3. Riješiti među kompleksnim brojevima $\dfrac{z-i}{z^2-i} = 2$. Možete koristiti formulu za nultočke kvadratne funkcije. 20
4. Odrediti sva koja postoje riješenja sustava linearnih jednadžbi i provjeriti: 15+5

$$\begin{aligned} x_1 - x_2 + x_3 &= 4 \\ 2x_1 + 2x_2 + 6x_3 &= 6 \\ -x_1 - 2x_2 - 4x_3 &= -4 \\ -4x_1 - x_2 - 9x_3 &= -16 \end{aligned}$$

5. Ispitati period (ako postoji) i ograničenost funkcije $h(x) = \sin(4x)$ 5+15

4. $x_1 - x_2 + x_3 = 4$
$2x_1 + 2x_2 + 6x_3 = 6$
$-x_1 - 2x_2 - 4x_3 = -4$
$-4x_1 - x_2 - 9x_3 = -16$

$$\left|\begin{array}{rrr|r} 1 & -1 & 1 & 4 \\ 2 & 2 & 6 & 6 \\ -1 & -2 & -4 & -4 \\ -4 & -1 & -9 & -16 \end{array}\right| \begin{array}{l} \\ R2-2R1 \\ R3+R1 \sim \\ R4+4R1 \end{array} \left|\begin{array}{rrr|r} 1 & -1 & 1 & 4 \\ 0 & 4 & 3 & -2 \\ 0 & -3 & -3 & 0 \\ 0 & -5 & -8 & 0 \end{array}\right| \begin{array}{l} \\ R2:4 \\ \sim \\ \\ \end{array} \left|\begin{array}{rrr|r} 1 & -1 & 1 & 4 \\ 0 & 1 & 3/4 & -2/4 \\ 0 & -3 & -3 & 0 \\ 0 & -5 & -8 & 0 \end{array}\right| \begin{array}{l} R1+R2 \\ \sim \\ R3+3R2 \\ R4+5R2 \end{array}$$

$$\left|\begin{array}{rrr|r} 1 & 0 & 7/4 & 7/2 \\ 0 & 1 & 3/4 & -2/4 \\ 0 & 0 & -3/4 & -3/2 \\ 0 & 0 & -12/4 & -5/2 \end{array}\right| \begin{array}{l} \\ \\ R3:(-3/4) \\ \\ \end{array} \sim \left|\begin{array}{rrr|r} 1 & 0 & 7/4 & 7/2 \\ 0 & 1 & 3/4 & -2/4 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & -12/4 & -5/2 \end{array}\right| \begin{array}{l} R1-\frac{7}{4}R3 \\ R2-\frac{3}{4}R3 \\ \sim \\ R4+\frac{12}{4}R3 \end{array} \left|\begin{array}{rrr|r} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & -4/2 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 6 \end{array}\right| \begin{array}{l} \\ \\ \\ R4:6 \sim \end{array} \left|\begin{array}{rrr|r} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 2 \\ 0 & 0 & 0 & 1 \end{array}\right|$$

NEMA RJEŠENJA

$$\left|\begin{array}{rrr} 1 & -1 & 1 \\ 2 & 2 & 6 \\ -1 & -2 & -4 \\ -4 & -1 & -9 \end{array}\right| \cdot \begin{pmatrix} 0 \\ -2 \\ 2 \\ 1 \end{pmatrix} = \begin{pmatrix} 4 \\ 6 \\ -4 \\ -16 \end{pmatrix}$$

$\frac{7}{2} - \left(2 \cdot \frac{7}{4}\right) = \frac{7}{2} - \frac{14}{4} = \frac{14}{4} - \frac{14}{4} = 0$

$-\frac{1}{2} - \left(2 \cdot \frac{3}{4}\right) = -\frac{1}{2} - \frac{6}{4} = \frac{-2}{4} - \frac{6}{4} = \frac{-8}{4} = \frac{-4}{2}$

$-\frac{5}{2} + \left(2 \cdot \frac{17}{4}\right) = -\frac{5}{2} + \frac{34}{4} = \frac{-10}{4} + \frac{34}{4} = \frac{24}{4} = 6$

$-3 + \left(3 \cdot \frac{3}{4}\right) = -3 + \frac{9}{4} = \frac{-12}{4} + \frac{9}{4} = \frac{-3}{4}$

1. $f(x)=\ln(x^2+1)$

KRITIČNE TOČKE

$$f'(x)=\ln(x^2+1)'=\frac{1}{(x^2+1)}\cdot 2x=\frac{2x}{(x^2+1)}=0$$

$2x=0 \quad x=0$

NUŽNI UVJET ZA INFLEKSIJU:

$$f''(x)=\left(\frac{2x}{(x^2+1)}\right)''=\frac{2\cdot(x^2+1)-2x\cdot 2x}{(x^2+1)^2}=\frac{2x^2+2-4x^2}{(x^2+1)^2}=\frac{-2x^2+2}{(x^2+1)^2}=0$$

$-2x^2+2=0$

$a=-2 \quad b=0 \quad c=2$

$$x_{1,2}=\frac{-b\pm\sqrt{b^2-4\cdot a\cdot c}}{2\cdot a}=\frac{0\pm\sqrt{0^2-4\cdot(-2)\cdot 2}}{2\cdot(-2)}$$

$$x_{1,2}=\frac{0\pm 4}{-4}$$

$x_1=-1 \quad I(-1,0)$

$x_2=1 \quad I(1,0)$ > INFLEKSIJA

	$-\infty$	-2	-1	0	1	2	$+\infty$
$f''(x)$		$-$		$+$		$-$	
$f'(x)$		⌒		⌓		⌒	