

**MATEMATIKA 1:** Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod!!

POPUNJAVA  
NASTAVNIK  
Broj ↓  
bodova

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ZAKRUŽITI AKO ŽELITE:      ustmeni kod prof. Uglešića

ε5

1) Među kompleksnim brojevima odrediti  $\sqrt[3]{\frac{8+6i}{8-6i}}$ . Prikazati rješenja u kompleksnoj ravnini!

~~10+5~~

2) Riješi sustav Gaussovom metodom i obavezno provjeri rješenje:

~~10+5~~

$$\begin{aligned} 4x - y + z + 2u &= 14 \\ 2x + y - 3u &= 2 \\ x - y + 2z + u &= 3 \\ 2x + y + z - 4u &= 0 \end{aligned}$$

3. Odrediti kada je  $\frac{x+1}{\sqrt{x^2-x}} + 1 > 0$  i obavezno provjeriti rješenje.

13+2

4) Za funkciju:  $f(x) = \sqrt{x^2 + 6x + 6}$  treba:

- (a) pronaći drugu derivaciju  
(b) na temelju ispitivanja toka funkcije skicirati graf

~~10~~

~~20(graf)~~

5. Odrediti i provjeriti rješenje  $\lim_{x \rightarrow +\infty} \left(\frac{n-4}{n}\right)^n =$

~~8+2~~

6. Riješiti jednadžbu  $\arccos x = e^x$  grafičkom metodom. *Provjeriti uvrštavanjem!*

10+5

Ukupno:

4.  $f(x) = \sqrt{x^2 + 6x + 6}$

2. ASIMPTOTE

V.A

1. DOMENA

$$\sqrt{x^2 + 6x + 6} \geq 0$$

$$x^2 + 6x + 6 \geq 0$$

$$x_{1/2} = \frac{-b \pm \sqrt{b^2 - 4 \cdot a \cdot c}}{2a}$$

$$x_{1/2} = \frac{-6 \pm \sqrt{6^2 - 4 \cdot 1 \cdot 6}}{2}$$

$$x_{1/2} = \frac{-6 \pm \sqrt{36 - 24}}{2}$$

$$x_{1/2} = \frac{-6 \pm \sqrt{12}}{2}$$

$$x_1 = \frac{-6 + \sqrt{12}}{2} = -1.27$$

$$x_2 = \frac{-6 - \sqrt{12}}{2} = -4.73$$

$$D_f: \langle -\infty, -4.73 \rangle \cup [-4.73, -1.27] \cup [-1.27, +\infty \rangle$$

$$\lim_{x \rightarrow -1.27^+} \sqrt{x^2 + 6x + 6} = \sqrt{(-1.27)^2 + 6 \cdot (-1.27) + 6} = \sqrt{1.61 - 7.62 + 6} = \sqrt{-0.01} = 0.1^+ = +\infty$$

$$\lim_{x \rightarrow -1.27^-} \sqrt{x^2 + 6x + 6} = \sqrt{(-1.27)^2 + 6 \cdot (-1.27) + 6} = \sqrt{1.61 - 7.62 + 6} = \sqrt{-0.01} = 0.1^- = -\infty$$

$$\lim_{x \rightarrow -4.73^+} \sqrt{x^2 + 6x + 6} = \sqrt{(-4.73)^2 + 6 \cdot (-4.73) + 6} = \sqrt{22.37 - 28.38 + 6} = \sqrt{-0.01} = 0.1^+ = +\infty$$

$$\lim_{x \rightarrow -4.73^-} \sqrt{x^2 + 6x + 6} = \sqrt{(-4.73)^2 + 6 \cdot (-4.73) + 6} = \sqrt{22.37 - 28.38 + 6} = \sqrt{-0.01} = 0.1^- = -\infty$$

$$x_1 = 0.1 \quad y_2 = -0.1$$

H.A

$$\lim_{x \rightarrow +\infty} \sqrt{x^2 + 6x + 6} / \sqrt{x^2}$$

$$\lim_{x \rightarrow +\infty} x^2 + 6x + 6 / : x^2$$

$$= 1 + \frac{6}{x} + \frac{6}{x^2}$$

$$H.A = 1$$

$$= 1$$

3. Glob. Svoj.

Parnost

$$f(x) = \sqrt{x^2 + 6x + 6}$$

$$f(-x) = \sqrt{(-x)^2 + 6(-x) + 6}$$

$$= \sqrt{x^2 - 6x + 6}$$

funkcija nije parna,  
a nije ni ne parna,  
promjenio se samo  
jedan predznak.

funkcija nije periodična  
jer nema cos i sin.

5. DERIVACIJA  $\frac{1}{2\sqrt{x}} \cdot (x)'$

$$f'(x) = \frac{1}{2\sqrt{x^2 + 6x + 6}}$$

$$f'(x) = \frac{1}{2\sqrt{x^2 + 6x + 6}} \cdot (x^2 + 6x + 6)'$$

$$= \frac{1}{2\sqrt{x^2 + 6x + 6}} \cdot 2x + 6$$

$$= \frac{2x + 6}{2\sqrt{x^2 + 6x + 6}}$$

$$f''(x) = \frac{2x + 6}{2\sqrt{x^2 + 6x + 6}}$$

$$= \frac{(2x+6)' \cdot (2\sqrt{x^2+6x+6}) - (2x+6) \cdot (2\sqrt{x^2+6x+6})'}{(2\sqrt{x^2+6x+6})^2}$$

$$= \frac{2 \cdot (2\sqrt{x^2+6x+6}) - (2x+6) \cdot (2 \cdot x + 6x + 6)}{(2\sqrt{x^2+6x+6})^2}$$

$$= \frac{2(2\sqrt{x^2+6x+6}) - (2x+6) \cdot 8}{(2 \cdot x + 6x + 6)^2} = \frac{2(2\sqrt{x^2+6x+6}) - (2x+6) \cdot 8}{(2x+6x+6)^2}$$

4. MULTO ČKE

$$f(x) = \sqrt{x^2 + 6x + 6}$$

$$\sqrt{x^2 + 6x + 6} / \checkmark$$

$$x^2 + 6x + 6 = 0$$

$$1x^2 + 6x = -6$$

$$7x^2 = -6 / :7$$

$$x^2 = -\frac{7}{6} / \sqrt{\quad}$$

$$x = \frac{49}{36}$$

$$f(x) = \sqrt{\left(\frac{49}{36}\right)^2 + 6 \cdot \left(\frac{49}{36}\right) + 6}$$

$$= \sqrt{\frac{2401}{1296} + \frac{49}{6} + 6}$$

$$= \sqrt{16.01}$$

$$= 4$$

6. KRITIČNE TOČKE

$$\frac{2x+6}{2\sqrt{x^2+6x+6}} = 0 \quad f(x) = \sqrt{x^2+6x+6}$$

$$2x+6 = 0$$

$$2x = -6 / :2$$

$$x = -\frac{2}{6} \cdot \frac{1}{3}$$

$$T\left(-\frac{1}{3}, 2\right)$$

$$= \sqrt{\left(-\frac{1}{3}\right)^2 + 6 \cdot \left(-\frac{1}{3}\right) + 6}$$

$$= \sqrt{\frac{1}{9} - 2 + 6}$$

$$= \sqrt{\frac{1}{9} + 4} = \sqrt{\frac{27}{9}} = 2$$

$$= \frac{2(2x+6x+6) - (2x+6) \cdot 8}{(2x+6x+6)^2}$$

$$= \frac{2 \cdot 8 \cdot (2x+6) - (2x+6) \cdot 8}{(2x+6x+6)^2}$$

$$= \frac{16(2x+6) - 8x+6}{8x+6}$$

$$= \frac{2(2x+6) - (2x+6) \cdot 8}{(2x+6x+6)^2}$$

$$2x+6$$

$$= 2$$

7. MONOTONOST

Matematika

$$\frac{2x+6}{2\sqrt{x^2+6x+6}} \geq 0$$

$$2x+6 > 0$$

$$2x > -6 \quad | :2$$

$$x > -\frac{6}{2} \quad | \frac{1}{3}$$

$$x > -\frac{1}{3}$$

$$2\sqrt{x^2+6x+6} \geq 0$$

$$2 \cdot x^2 + 6x + 6 \geq 0$$

$$2x^2 + 6x + 6 \geq 0$$

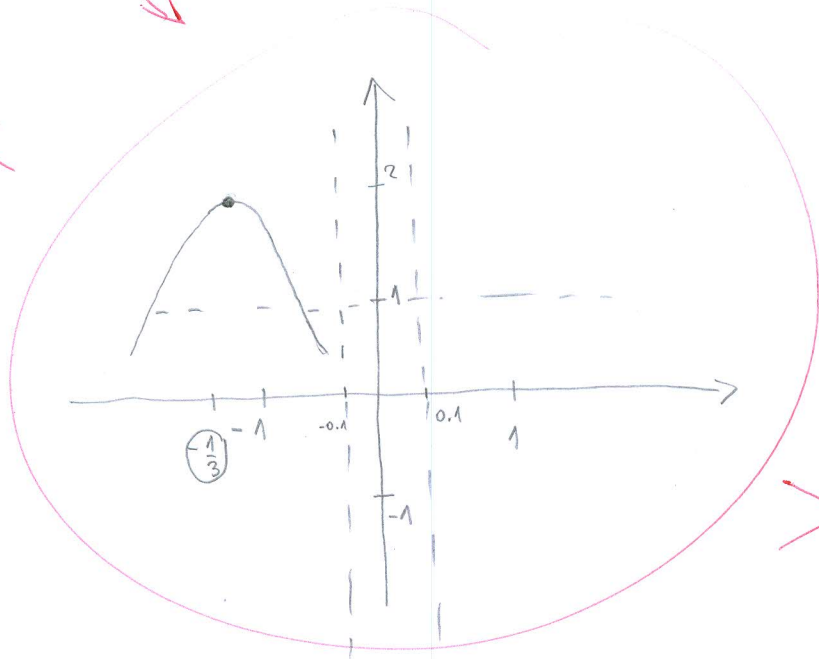
$$8x + 6 > 0$$

$$8x > -6 \quad | :8$$

$$x > -\frac{6}{8}$$

$$x > -\frac{3}{4}$$

$-\infty$	$-\frac{1}{3}$	$\frac{1}{3}$	$0$	$+\infty$
$2x+6$	-	-	+	
$2\sqrt{x^2+6x+6}$	∩	∩	∪	



$$5. \lim_{x \rightarrow \infty} \left( \frac{n-4}{n} \right)^n \quad | : n = \frac{1 - \frac{4}{n}}{1} = 1$$

