

**MATEMATIKA 1:** Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj

POPUNJAVA

odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod!!

F4

NASTAVNIK

Broj ↓

bodova

IME I PREZIME: JURE DUNDOVIĆ

BROJ INDEKSA:

ZAOKRUŽITI AKO ŽELITE:      ustmeni kod prof. Uglešića

1. Neka su  $z_1$  i  $z_2$  rjesenja kvadratne jednadzbe  $z^2 - z + 8 = 0$ . *Prikaži ih u kompleksnoj ravnini!* Dalje izracunaj:  $\left(\frac{z_1 - z_2}{z_2 + 4}\right)$  i  $\text{Im}\left(\left(\frac{z_2}{z_1}\right)\right)$ .

12+3

2. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje:

~~10+5~~ 5

$$x_1 + x_2 - x_3 - 3x_4 + 4x_5 = 2$$

$$3x_1 + x_2 - x_3 - x_4 = 2$$

$$9x_1 + x_2 - 2x_3 - x_4 - 2x_5 = 5$$

$$x_1 - x_2 - x_4 + 2x_5 = 1$$

3. Odrediti domenu funkcije  $g(x) = \sqrt{x^2 + x - 2} - \arctan(x^2 - x)$ .

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4. Odrediti tok funkcije  $f(x) = \frac{x^2 - 6}{x^2 + 8}$

20(graf) 10

5. Odrediti i provjeriti:

(a)  $\lim_{x \rightarrow -4} \frac{x^2 - 10}{x^2 + 8x + 16} =$

4+1

(b)  $\lim_{n \rightarrow \infty} \left(\frac{n+3}{n}\right)^n =$

8+2

6. Grafički približno riješiti:  $8 - \ln x > \arctan x$ . Ne zaboravi eksplicitno zapisati skup rješenja. *Provjeri približno rješenje jednadzbe uvrštavanjem, a također provjeri nekoliko rješenja nejednadzbe uvrštavanjem!*

15+5

Ukupno:  
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3)  $g(x) = \sqrt{x^2 + x - 2} - \arctan(x^2 - x)$   
= 0  $\mathbb{R}$

$$x^2 + x - 2 = 0$$

$$x^2 + x - 2 = 0$$

$$x_{1,2} = \frac{-1 \pm \sqrt{1+8}}{2}$$

$$x_1 = \frac{-1+3}{2}$$

$$x_2 = \frac{-1-3}{2}$$

$$x_1 = 1$$

$$x_2 = -2$$



$$Df = \langle -\infty, -2 \rangle \cup [1, +\infty)$$



$$4) f(x) = \frac{x^2 - 6}{x^2 + 8}$$

$$x^2 + 8 \neq 0$$

$$x^2 \neq -8 \cup$$

$$D_f = \mathbb{R}$$

$$x^2 - 6 = 0$$

$$x^2 = 6$$

$$x_1 = \sqrt{6}, x_2 = -\sqrt{6} \Rightarrow \text{MULTIPLICI}$$

$$f'(x) = \frac{2x \cdot (x^2 + 8) - (x^2 - 6) \cdot 2x}{(x^2 + 8)^2} = \frac{2x(x^2 + 8 - x^2 + 6)}{(x^2 + 8)^2} = \frac{2x \cdot 14}{(x^2 + 8)^2} = \frac{28x}{(x^2 + 8)^2}$$

$-\infty$	$0$	$+\infty$
$28x$	$-$	$+$
$28x$	$-$	$+$
$(x^2 + 8)^2$		

$$f''(x) = \frac{28 \cdot (x^2 + 8)^2 - 28x \cdot 2(x^2 + 8) \cdot 2x}{(x^2 + 8)^4} = \frac{28(x^2 + 8)(-3x^2 + 8)}{(x^2 + 8)^4}$$

$-\infty$	$-\sqrt{\frac{8}{3}}$	$\sqrt{\frac{8}{3}}$	$+\infty$
$-3x^2 + 8$	$-$	$+$	$-$
$f''(x)$	$-$	$+$	$-$

$-\infty$	$-\sqrt{\frac{8}{3}}$	$0$	$\sqrt{\frac{8}{3}}$	$+\infty$
$f'(x)$	$-$	$-$	$+$	$+$
$f''(x)$	$-$	$+$	$+$	$-$
$f(x)$	$)$	$($	$)$	$($

$$x^2 + 8 = 0$$

$$x^2 = -8$$

$$-3x^2 + 8 = 0$$

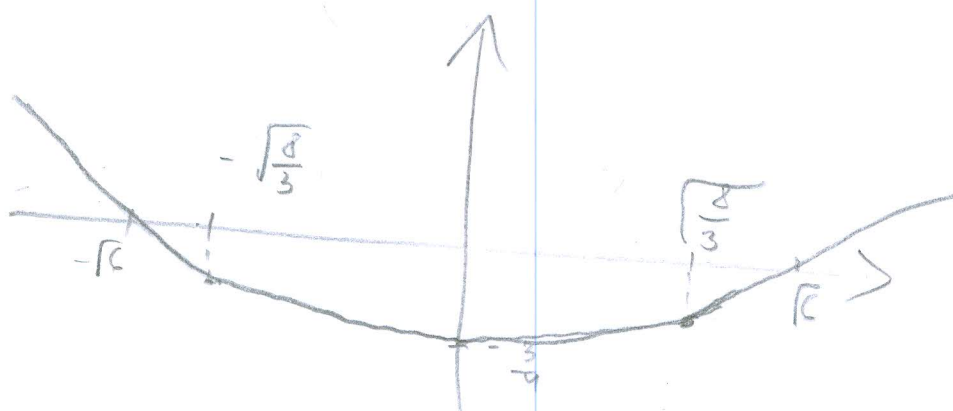
$$3x^2 = 8 \quad x_1 = \sqrt{\frac{8}{3}}$$

$$x^2 = \frac{8}{3} \quad x_2 = -\sqrt{\frac{8}{3}}$$

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SAT GRAFA SE NE  
VIDI ŠTO SE DOGAĐA  
SASVIM LIJEVO I  
DESNO?

H.A.



$$\begin{aligned} 2) \quad & x_1 + x_2 - x_3 - 3x_4 + 4x_5 = 2 \\ & 3x_1 + x_2 - x_3 - x_4 = 2 \\ & 9x_1 + x_2 - 2x_3 - x_4 - 2x_5 = 5 \\ & x_1 - x_2 - x_4 + 2x_5 = 1 \end{aligned}$$

$$\left[ \begin{array}{ccccc|c} 1 & 1 & -1 & -3 & 4 & 2 \\ 3 & 1 & -1 & -1 & 0 & 2 \\ 9 & 1 & -2 & -1 & -2 & 5 \\ 1 & -1 & 0 & -1 & 2 & 1 \end{array} \right] \begin{array}{l} \\ \text{II} - 3\text{I} \\ \text{III} - 3\text{I} \\ \text{IV} - \text{I} \end{array}$$

$$\left[ \begin{array}{ccccc|c} 1 & 1 & -1 & -3 & 4 & 2 \\ 0 & -2 & 2 & 8 & -12 & -4 \\ 0 & -8 & 7 & 26 & -38 & -13 \\ 0 & -2 & 1 & 2 & -2 & -1 \end{array} \right] \begin{array}{l} \\ \text{IV} - \text{IV} \\ \text{III} - 4\text{IV} \\ \end{array}$$

$$\left[ \begin{array}{ccccc|c} 1 & 1 & -1 & -3 & 4 & 2 \\ 0 & 0 & 1 & 6 & -10 & -3 \\ 0 & 0 & 3 & 18 & -30 & -9 \\ 0 & -2 & 1 & 2 & -2 & -1 \end{array} \right]$$

$$\left[ \begin{array}{ccccc|c} 1 & 1 & -1 & -3 & 4 & 2 \\ 0 & -2 & 1 & 2 & -2 & -1 \\ 0 & 0 & 3 & 18 & -30 & -9 \\ 0 & 0 & 1 & 6 & -10 & -3 \end{array} \right] \begin{array}{l} \text{I} + \text{IV} \\ \\ \text{III} - 3\text{IV} \end{array}$$

$$\left[ \begin{array}{ccccc|c} 1 & -3 & 0 & -1 & 2 & 2 \\ 0 & -2 & 1 & 2 & -2 & -1 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 6 & -10 & -3 \end{array} \right]$$

$$\left[ \begin{array}{ccccc|c} 1 & -3 & 0 & -1 & 2 & 2 \\ 0 & -2 & 1 & 2 & -2 & -1 \\ 0 & 0 & 1 & 6 & -10 & -3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array} \right] \begin{array}{l} \\ \text{II} - \text{III} \\ \\ \end{array}$$

$$\left[ \begin{array}{ccccc|c} 1 & -3 & 0 & -1 & 2 & 2 \\ 0 & -2 & 0 & -4 & 8 & 2 \\ 0 & 0 & 1 & 6 & -10 & -3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{array} \right]$$

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Sustav ima beskonечно mnogo rjesenja!

$$\begin{aligned} x_1 &= a - 3b + c + 2e = 2 \\ x_2 &= -2b - 4d + 8e = 2 \\ x_3 &= c + 6d - 10e = -3 \\ x_4 &= a \end{aligned}$$

DA, ALI ISPOD NISU  
RJESENJA  
 $x_5 = ?$   
PROVJERA?

