MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ B2

IME I PREZIME: Roko Šimurina **BROJ INDEKSA:**

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2+7}$ ~~10~~ 8
3. Ispitati asimptote funkcije: $h(x) = \sqrt{x^2+2x}$. Zatim dovršiti ispitivanje toka i skicirati graf. 10(asimptote) 20(graf) 8 10
4. Odrediti i uvrštavanjem (kalkulator) provjeriti rezultat

   (a) $\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right) =$ 7+2

   (b) $\lim_{n\to\infty}\left(\frac{x^2+6}{x^2}\right) =$ 4+2
5. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje: 15+5

$$\begin{array}{rcrcrcr} 4x & - & y & + & z & + & 2u = & -1 \\ 2x & + & y & & & - & 3u = & 4 \\ x & - & y & + & 2z & + & u = & 2 \\ 2x & + & y & + & z & - & 4u = & 7 \end{array}$$

6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2-1))$. 10

Ukupno: ~~85~~ 59

2.

$g(x) = \sqrt{x^2+7}$

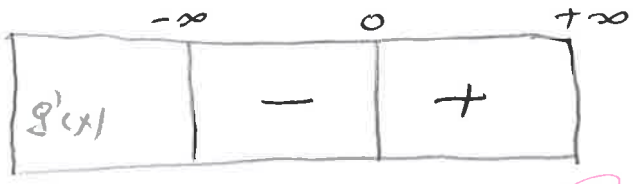
$x^2+7 \geq 0$

$x^2 \geq -7$

$D(g) = \mathbb{R}$

$g'(x) = \frac{2x}{2\sqrt{x^2+7}} = \frac{x}{\sqrt{x^2+7}}$

$g'(x) = 0 \Rightarrow x = 0$



$g(0) = \sqrt{7} \Rightarrow \min(0, \sqrt{7})$ ✓ GLOB MAX?

8

6. $f(x) = \ln(\cos(2x^2-1))$

$$f'(x) = \frac{1}{\cos(2x^2-1)} \cdot (-\sin(2x^2-1)) \cdot 4x \quad \checkmark$$

$$= -4x \cdot \operatorname{tg}(2x^2-1)$$

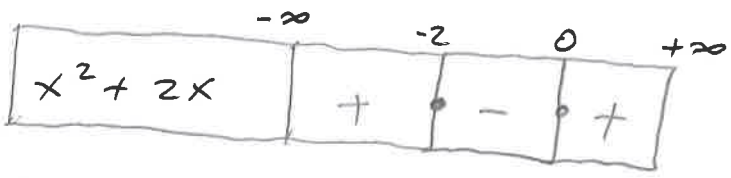
---

3. $h(x) = \sqrt{x^2+2x}$

$x^2+2x \geq 0$

$x(x+2) \geq 0$

$x_1 = 0 \qquad x_2 = -2$



$D(h) = \langle -\infty, -2] \cup [0, +\infty \rangle$

$\lim_{x \to -2^-} h(x) = 0 \qquad \lim_{x \to 0^+} h(x) = 0$ Nema V. A.

$$k = \lim_{x \to -\infty} \frac{\sqrt{x^2+2x}}{x} = \lim_{x \to -\infty} -\sqrt{1+\frac{2}{x}} = -1$$

$$L = \lim_{x \to -\infty} \left(\sqrt{x^2+2x} + x\right) \cdot \frac{\sqrt{x^2+2x} - x}{\sqrt{x^2+2x} - x}$$

$$= \lim_{x \to -\infty} \frac{x^2+2x-x^2 \,/:x}{\sqrt{x^2+2x} - x \,/:x} = \lim_{x \to -\infty} \frac{2}{-\sqrt{1+\frac{2}{x}} - 1} = -1 \quad \checkmark$$

$\angle kA \ldots y = -x-1$ ✓

D. K. A. – ?

Roko Simunina

3. $k = \lim_{x \to +\infty} \frac{\sqrt{x^2+2x}}{x} = \lim_{x \to +\infty} \sqrt{1+\frac{2}{x}} = 1$

$L = \lim_{x \to +\infty} \left(\sqrt{x^2+2x} - x\right) \cdot \frac{\sqrt{x^2+2x}+x}{\sqrt{x^2+2x}+x}$

$= \lim_{x \to +\infty} \frac{x^2+2x-x^2 \,/:x}{\sqrt{x^2+2x}+x \,/:x} = \lim_{x \to +\infty} \frac{2}{\sqrt{1+\frac{2}{x}}+1} = 1$

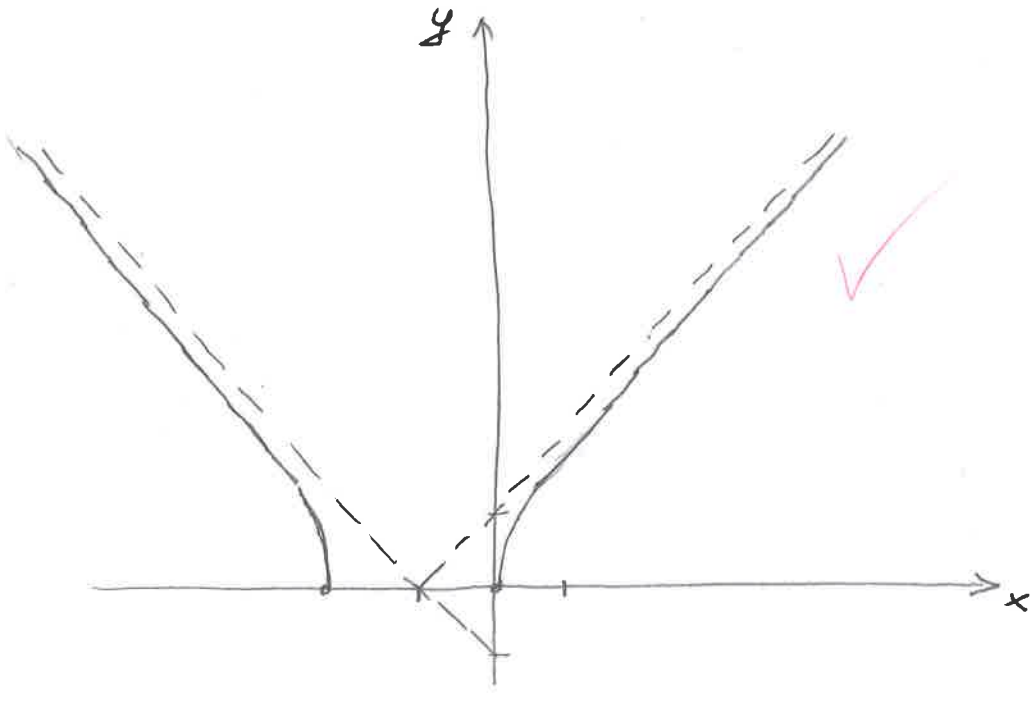
DkA ... $y = x+1$ ✓ 10

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

$h'(x) = 0 \Rightarrow x = -1$ (Nije u Domeni)

	$-\infty$		-2		0		$+\infty$
$h'(x)$		$-$				$+$	
		↘				↗	

$\min(-2,0)$ $\qquad$ $\min(0,0)$



✓

4.

a) $\lim_{x \to 0} \left(\frac{\sqrt{7+x} - \sqrt{7}}{x} \right) = \left[\frac{0}{0} \right] \underline{\underline{L'H}}$

$= \lim_{x \to 0} = \frac{1}{2\sqrt{7+x}} = \frac{1}{2\sqrt{7}}$ ✓

b) $\lim_{n \to \infty} \left(\frac{x^2+6}{x^2} \right) = \lim_{n \to \infty} \left(1 + \frac{6}{x^2} \right) = 1$ ✓

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod↓↓ B2

IME I PREZIME: Sejla Šakanović **BROJ INDEKSA:** 17-2-0386-2014

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 7}$ 10
3. Ispitati asimptote funkcije: $h(x) = \sqrt{x^2 + 2x}$. Zatim dovršiti ispitivanje toka i skicirati graf. 10(asimptote) 20(graf)
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5. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje: 15+5

$$\begin{array}{rcrcrcr} 4x & - & y & + & z & + & 2u = & -1 \\ 2x & + & y & & & - & 3u = & 4 \\ x & - & y & + & 2z & + & u = & 2 \\ 2x & + & y & + & z & - & 4u = & 7 \end{array}$$

6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2 - 1))$. 10

Ukupno: 42

1. $z^3 - 6 + 7i = 0$

$z^3 = 6 - 7i$

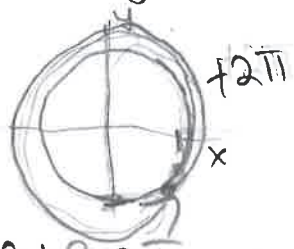
$z = \sqrt[3]{6-7i}$ (w)

$w = 6 - 7i$

$x = 6 \quad y = -7$

$|w| = \sqrt{6^2 + 7^2} = \sqrt{85}$

$\operatorname{tg}\varphi = -\frac{7}{6} \quad -0.862 + 2\pi = 5.42$



$w = \sqrt{85}(\cos 5.42 + i \sin 5.42)$

$k = 0 \Rightarrow z_1 = \sqrt[3]{\sqrt{85}} \cdot \left(\cos\frac{5.42 + 2\cdot 0\cdot\pi}{3} + i\sin\frac{5.42+2\cdot 0\cdot\pi}{3}\right)$

$= \sqrt[3]{85} \cdot (-0.23 + 0.97i)$

$= -0.48 + 2.03i$

$k = 1 \Rightarrow z_2 = \sqrt[3]{\sqrt{85}} \cdot \left(\cos\frac{5.42 + 2\cdot 1\cdot\pi}{3} + i\sin\frac{5.42+2\cdot 1\cdot\pi}{3}\right)$

$= \sqrt[3]{\sqrt{85}} \cdot (-0.73 + (-0.69i))$

$= -1.53 - 1.45i$

$k=2 \rightarrow z_3 = \sqrt[3]{\sqrt{85}} \cdot \left(\cos\frac{5.42+2\cdot 2\cdot\pi}{3} + i\sin\frac{5.42+2\cdot 2\cdot\pi}{3}\right)$

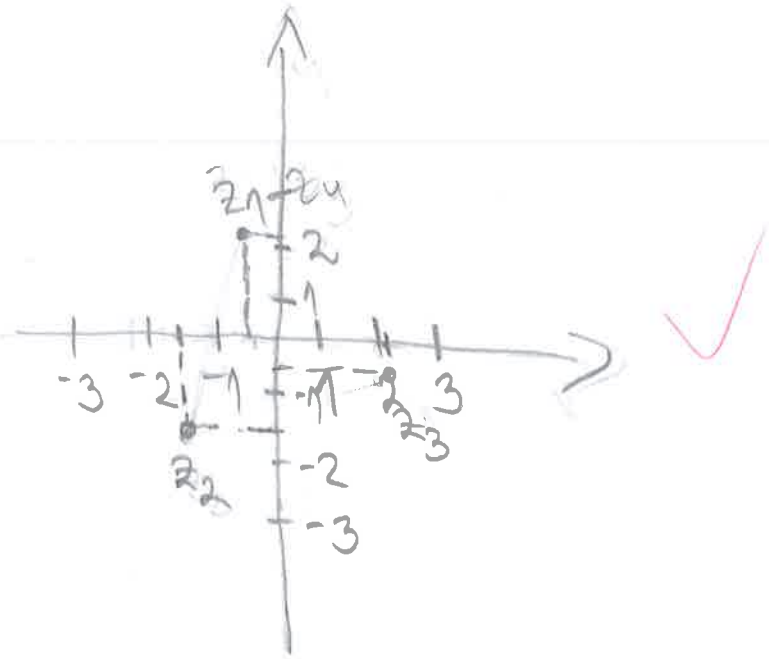
$= \sqrt[3]{\sqrt{85}} \cdot (0.96 + (-0.28i))$

$= 2.01 - 0.59i$

$k=3 \rightarrow z_4 = \sqrt[3]{\sqrt{85}} \cdot \left(\cos\frac{5.42+2\cdot 3\cdot\pi}{3} + i\sin\frac{5.42+2\cdot 3\cdot\pi}{3}\right)$

$= \sqrt[3]{\sqrt{85}} \cdot (-0.23 + 0.97i)$

$= -0.48 + 2.03i$



4. a) $\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right)=\left(\frac{\sqrt{7+0}-\sqrt{7}}{0}\right)=\frac{\sqrt{7}-\sqrt{7}}{0}=\frac{0}{0}=$ ✗

b) $\lim_{x\to\infty}\left(\frac{x^2+6}{x^2}\right)=L.H.=\lim_{x\to\infty}\left(\frac{x^2+6}{x^2}\Big/\frac{x^2}{x^2}\right)=\lim_{x\to\infty}\frac{1+\frac{6}{x^2}}{1}=1$ ✗

$=1$ ✓

(3) NASTAVAK 3. zadatka

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

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

$f'(x)=0$

$2x+2=0$

$2x=-2$

$x=-1$

$S(-1,0)$

$f'(x)$		
f		

IME I PREZIME: Šegla Šakanović BROJ INDEKSA: 17-2-0386-2014

2. $g(x)=\sqrt{x^2+7}$

$g'(x)=\frac{1}{2\sqrt{x^2+7}}\cdot 2x=\frac{2x}{2\sqrt{x^2+7}}=\frac{x}{\sqrt{x^2+7}}$

$g'(x)=0$ $(0,\sqrt{7})$ -min ✓ MAX ?

$x=0$

3. $h(x)=\sqrt{x^2+2x}$

$x^2+2x\geq 0$

$x(x+2)\geq 0$

$x\geq 0 \quad x\geq -2$

vertikalna asimtota

$\lim_{x\to -2^-}\sqrt{x^2+2x}=\infty$

$\lim_{x\to -2^+}\sqrt{x^2+2x}=\infty$ } OVA - 2 $x=-2$

$\lim_{x\to 0^+}\sqrt{x^2+2x}=0$

$\lim_{x\to 0^-}\sqrt{x^2+2x}=0$ } OVA $x=0$

H ASM.

$\lim_{x\to\infty}\sqrt{x^2+2x}=\lim_{x\to\infty}\sqrt{\frac{x^2}{x^2}+\frac{2x}{x^2}}=\sqrt{1+\frac{2}{x}}=\sqrt{1}=1$ ✗

OHA $y=1$

$f(x)=0$ NT $(0,0)$ $(-2,0)$

$x^2+2x=0$

$x(x+2)=0$

$x=0 \quad x+2=0$

$x=-2$

6. $f(x) = \ln(\cos(2x^2-1))$

$f'(x) = \ln'(\cos(2x^2-1)) \cdot (\cos(2x^2-1))' \cdot (2x^2-1)'$

$= \frac{1}{\cos(2x^2-1)} \cdot (-\sin(2x^2-1)) \cdot 2x$ ✓

$= -2x \cdot tg(2x^2-1)$

IME I PREZIME: Šejla Šakanović BROJ INDEKSA: 17-2-0388-2014

⑤

$$\begin{bmatrix} 4 & -1 & 1 & 2 & | & -1 \\ 2 & 1 & 0 & -3 & | & 4 \\ 1 & -1 & 2 & 1 & | & 2 \\ 2 & 1 & 1 & -4 & | & 7 \end{bmatrix} \sim \begin{bmatrix} 1 & -1 & 2 & 1 & | & 2 \\ 2 & 1 & 0 & -3 & | & 4 \\ 4 & -1 & 1 & 2 & | & -1 \\ 2 & 1 & 1 & -4 & | & 7 \end{bmatrix} \begin{matrix} \cdot(-2) \\ \cdot(-4) \\ \cdot(-2) \end{matrix} \sim$$

$$\sim \begin{bmatrix} 1 & -1 & 2 & 1 & | & 2 \\ 0 & 3 & -4 & -5 & | & 0 \\ 0 & 3 & -7 & -2 & | & -9 \\ 0 & 3 & -3 & -6 & | & 3 \end{bmatrix} :(3) \sim \begin{bmatrix} 1 & -1 & 2 & 1 & | & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & | & 0 \\ 0 & 3 & -7 & -2 & | & -9 \\ 0 & 3 & -3 & -6 & | & 3 \end{bmatrix} \begin{matrix} \\ \cdot 1 \\ \cdot(-3) \\ \\ \end{matrix} \sim$$

$$\sim \begin{bmatrix} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & | & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & | & 0 \\ 0 & 0 & -3 & 3 & | & -9 \\ 0 & 0 & 1 & -1 & | & 3 \end{bmatrix} (:-3) \sim \begin{bmatrix} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & | & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & | & 0 \\ 0 & 0 & 1 & -1 & | & 3 \\ 0 & 0 & 1 & -1 & | & 3 \end{bmatrix} \begin{matrix} \\ \\ \cdot(-1) \\ \\ \end{matrix} \begin{matrix} \\ \\ \cdot\frac{4}{3} \\ \\ \end{matrix} \begin{matrix} \\ \\ \cdot\frac{2}{3} \\ \\ \end{matrix} \sim$$

$$\begin{bmatrix} 1 & 0 & 0 & 0 & | & 0 \\ 0 & 1 & 0 & -3 & | & 4 \\ 0 & 0 & 1 & -1 & | & 3 \\ 0 & 0 & 0 & 0 & | & 0 \end{bmatrix} \text{ nije rješenje} \quad \begin{bmatrix} x = 0 \\ y = 4 \\ z = 3 \\ u = 0 \end{bmatrix} \rightarrow \text{rješenje Gausovom metodom}$$

BESKONAČNO RJEŠENJA

$x = 0$

$y = 4 + 3u$

$z = 3 + u$

$$\begin{bmatrix} x \\ y \\ z \\ u \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ 3 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ 3 \\ 1 \\ 1 \end{bmatrix} \lambda, \lambda \in \mathbb{R}$$

PROVJERA:

$4 \cdot 0 - 4 + 3 + 2 \cdot 0 = -1$

$0 + 1 - 1 = -1$

$2 \cdot 0 + 4 - 3 \cdot 0 = 4$

$4 = 4$

$0 - 4 + 2 \cdot 3 + 0 = 2$

$2 = 2$

$2 \cdot 0 + 4 + 3 - 4 \cdot 0 = 7$

$7 = 7$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇓⇓ B2

IME I PREZIME: STIPE PREDOVIĆ **BROJ INDEKSA:** 0269082252

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

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5. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje: 15+5

$$\begin{array}{rcrcrcrcr} 4x & - & y & + & z & + & 2u & = & -1 \\ 2x & + & y & & & - & 3u & = & 4 \\ x & - & y & + & 2z & + & u & = & 2 \\ 2x & + & y & + & z & - & 4u & = & 7 \end{array}$$

6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2 - 1))$. 10

Ukupno: 24

STIPE PREDOVAN IZVANREDNI

IME I PREZIME: **BROJ INDEKSA:**

5) Riješi sustav gaussovom metodom i obavezno provjeri rješenje. ... 0 4 -3 0

$$\begin{aligned} 4x - y + z + 2u &= -1 \\ 2x + y - 3u &= 4 \\ x - y + 2z + u &= 2 \\ 2x + y + z - 4u &= 7 \end{aligned}$$

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right]$$

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \quad / \cdot(-2) \; / \cdot(-4) \; / \cdot(-2)$$

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -4 & -5 & 0 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \quad :3$$

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \quad / \cdot 1 \; / \cdot(-3) \; / \cdot(-3)$$

$$\left[\begin{array}{cccc|c} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & -3 & 3 & -9 \\ 0 & 0 & 1 & -1 & 3 \end{array}\right] \quad :(-3)$$

$$\left[\begin{array}{cccc|c} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 1 & -1 & 3 \end{array}\right] \quad / \cdot(-1) \; / \cdot\left(-\tfrac{2}{3}\right) \; / \cdot\tfrac{4}{3}$$

$$\left[\begin{array}{cccc|c} x & y & z & u & \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -3 & 4 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

Gledam x koje mi smeta da bude čisti BROJEVI

Sustav ima beskonačno mnogo rješenja a mi moramo naći jedno od rješenja i umtiti

$$\begin{bmatrix} x \\ y \\ z \\ u \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ 3 \\ 0 \end{bmatrix} + \begin{bmatrix} 0 \\ 3 \\ 1 \\ 1 \end{bmatrix} \lambda \quad \lambda \in \mathbb{R}$$

10

$x = 0$ $\quad z = k$

$y - u = 4$ $\quad k = \mathbb{R}$

$u - z = -3 \cdot 4$

$x = 0$

$y = 4 + z u$

$u = -3 \cdot 4 + z$

$\begin{bmatrix} x = \\ y = \\ z = \\ u = \end{bmatrix} = \begin{bmatrix} \\ \\ \\ \end{bmatrix}$

$x = 0$

$y - 3u = 4$ $\quad u = k$

$z - u = -3 \cdot 4$ $\quad k = \mathbb{R}$

$x = 0$

$y = 4 + 3u$

$z = -3 \cdot 4 + u$

$x = 0$

$y = 4 + 3 \cdot k$

$z = -3 \cdot 4 + k$

$u = 0$

$x = 0$

$y = 4$

$z = -3$

$u = 0$

$x = 0$

$y - 3u = 4$

$z \neq u$

$4 \cdot 0 - 4 + 3 + 2 \cdot 0 = -1$ OVO JE PROVJERA

$2 \cdot 0 + 4 - 3 \cdot 0 = 4$

$0 - 4 + 2 \cdot 3 + 0 = 2$

$2 \cdot 0 + 4 + 3 - 4 \cdot 0 = 7$

$$z_1 = \sqrt[3]{9.22} \cdot \left[\cos\left(\frac{5.42+2\cdot 1\cdot\pi}{3}\right) + i \cdot \sin\left(\frac{5.42+2\cdot 1\cdot\pi}{3}\right)\right]$$

$$z_1 = \sqrt[3]{9.22} \cdot [-0.72 - 0.68i]$$

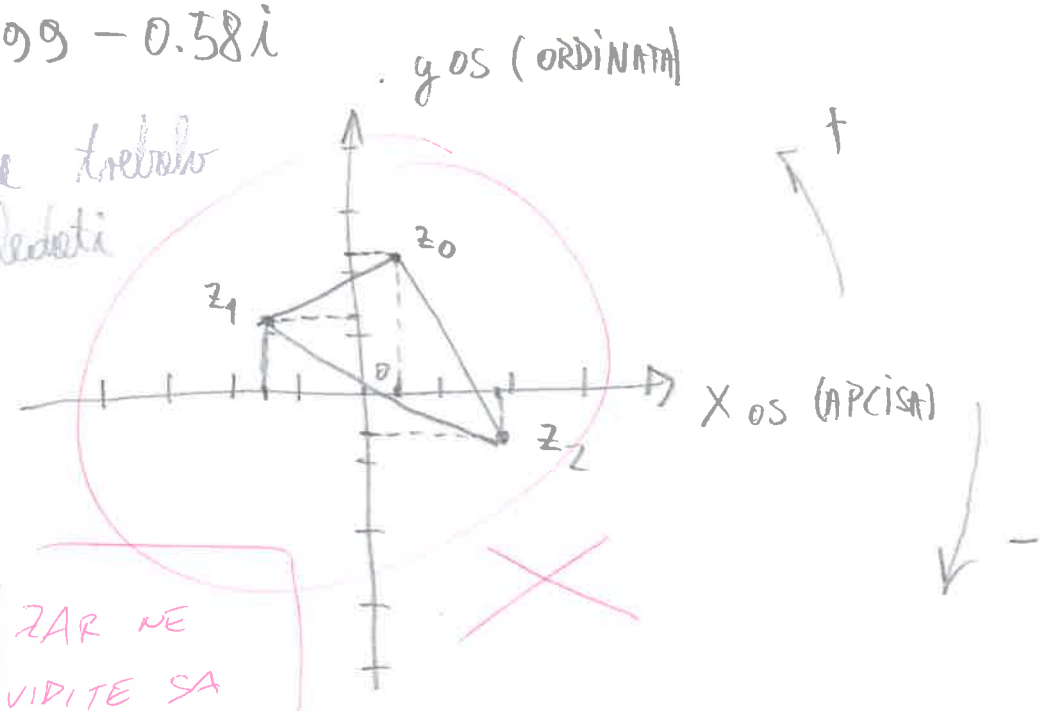
$$z_1 = -1.51 + 1.43i$$

$$z_2 = \sqrt[3]{9.22} \cdot \left[\cos\left(\frac{5.42+2\cdot 2\cdot\pi}{3}\right) + i \cdot \sin\left(\frac{5.42+2\cdot 2\cdot\pi}{3}\right)\right]$$

$$z_2 = \sqrt[3]{9.22} \cdot [0.95 + i \cdot (-0.28)]$$

$$z_2 = 1.99 - 0.58i$$

Otprilike trebalo bi izgledati ovako



ZAR NE VIDITE SA SKICE DA NIJE DOBRO?

TREBALI BI VIDJETI ZNAK MERCEDESA!

IME I PREZIME: STIPE PREDOVAN BROJ INDEKSA: 0269082252

1) Riješi jednadžbu među kompleksnim brojevima $z^3 - 6 + 7i = 0$. Prikaži rješenja u kompleksnoj ravnini.

$z^3 - 6 + 7i = 0$

$z^3 = 6 - 7i \quad / \sqrt[3]{}$

$z = \sqrt[3]{6 - 7i}$

$x = 6 \quad y = -7$

$\varphi = \arctg \frac{y}{x}$

$\varphi = \arctg \frac{-7}{6}$

$\varphi = -0.86 \text{ A}$

KUT NE SMI BITI NEGATIVAN

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

$r = \sqrt{(6)^2 + (-7)^2}$

$r = 9.22$

Kod je x pozitivan a ypsilon negativan radi se o četvrtom kvadrantu pa je φ_{PRAVI} dalje kod $2 \cdot \pi + (\varphi)$ → KOJI IMAMO

$\varphi_{PRAVI} = 2 \cdot 3.14 + (-0.86)$

$\varphi_{PRAVI} = 5.42$

Pošto je z^3 to znači da želimo imati 3 kompleksna rješenja

Koristimo formulu:

$$z_k = \sqrt[n]{r} \cdot \left[\cos \left(\frac{\varphi + 2k\pi}{n} \right) + i \cdot \sin \left(\frac{\varphi + 2k\pi}{n} \right) \right], \quad k = 0, 1, 2$$

$$z_0 = \sqrt[3]{9.22} \cdot \left[\cos \left(\frac{5.42 + 2 \cdot 0 \cdot \pi}{3} \right) + i \cdot \sin \left(\frac{5.42 + 2 \cdot 0 \cdot \pi}{3} \right) \right]$$

$$z_0 = \sqrt[3]{9.22} \cdot [-0.23 + i \cdot 0.97]$$

$z_0 = -0.48 + 2.03i$ ✓

4) pod b)

$$\lim_{x\to\infty}\left(\frac{x^2+6}{x^2}\right)\begin{matrix}/:x^2\\/:x^2\end{matrix}$$

$$\lim_{x\to\infty}\left(\frac{1+\frac{6}{x^2}}{1}\right)$$

$$\lim_{x\to\infty}\left(\frac{1+0}{1}\right)$$

$$\lim_{x\to\infty}\frac{1}{1}=1$$ ✓

Kada limes teži u beskonačno neki razlomak dijeka neki broj kroz nešto je nula.

4) pod a

$$\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right)$$

$$\lim_{x\to 0}\left(\frac{\sqrt[2]{7+x}-\sqrt{7}}{x}\right)$$

$$\lim_{x\to 0}\left(\frac{\left(7+x^{\frac{1}{2}}\right)-\sqrt{7}}{x}\right)$$

$$\overset{L'H}{\lim_{x\to 0}}\left(\frac{\left(7+x^{\frac{1}{2}}\right)-\sqrt{7}}{x}\right)'$$

$$\lim_{x\to 0}\left(\frac{\frac{1}{2}\cdot\sqrt{7+x}^{\frac{1}{2}-1}\cdot\left(7+x^{\frac{1}{2}}\right)'-0}{1\cdot x^{1-1}}\right)$$

$$\lim_{x\to 0}\left(\frac{\frac{1}{2}\cdot\sqrt{7+x}^{-\frac{1}{2}}\cdot}{1}\right)=\ ?$$

$$=e$$

STIPE PREDOVAN
VANREDNI

IME I PREZIME: **BROJ INDEKSA:**

6) Odrediti prvu derivaciju funkcije

$$f(x)=\ln(\cos(2x^2-1))$$

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

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

$$f'(x)=\frac{1}{\cos(2x^2-1)}\cdot(-\sin x\cdot(2x^2-1)\cdot(2\cdot 2\cdot x^{2-1}-0))$$

$$f'(x)=\frac{1}{\cos(2x^2-1)}\cdot\frac{(-\sin x\cdot(2x^2-1)\cdot 4x)}{1}$$ ✓

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

$\frac{\sin x}{\cos x}=\operatorname{tg} x$

$$f'(x)=4x\cdot\operatorname{tg}(2x^2-1)$$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ B2

IME I PREZIME: JURE ŠUŠIĆ **BROJ INDEKSA:** 17-1-0259-2014 0269087878

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 7}$ 10
3. Ispitati asimptote funkcije: $h(x) = \sqrt{x^2 + 2x}$. Zatim dovršiti ispitivanje toka i skicirati graf. 10(asimptote) 20(graf)
4. Odrediti i uvrštavanjem (kalkulator) provjeriti rezultat
   (a) $\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right) =$ 7+2
   (b) $\lim_{n\to\infty}\left(\frac{x^2+6}{x^2}\right) =$ 4+2
5. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje: 15+5

$$\begin{array}{rcrcrcr} 4x & - & y & + & z & + & 2u = & -1 \\ 2x & + & y & & & - & 3u = & 4 \\ x & - & y & + & 2z & + & u = & 2 \\ 2x & + & y & + & z & - & 4u = & 7 \end{array}$$

6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2 - 1))$. 10

Ukupno: 21

4.) a) $\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right) = \frac{\sqrt{7}-\sqrt{7}}{0} = \frac{0}{0} = 0$ VA... $x = 0$

b) $\lim_{n\to\infty}\left(\frac{x^2+6\,/:x^2}{x^2/:x^2} = \frac{\infty}{\infty}\right) \lim_{n\to\infty} \frac{1+\frac{6}{x^2}\to 0}{1} = \frac{1}{1} = 1$ HA... $y = 1$

6.) $f(x) = \ln(\cos(2x^2-1))$

$f'(x) = \frac{1}{\cos(2x^2-1)} \cdot -2\sin(2x^2+1) + 4x = \frac{-2\sin(2x^2+1)+4x}{\cos(2x^2-1)}$

5.) $x \quad y \quad z \quad u$

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \cdot \frac{1}{4}$$

$$\left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & -\frac{1}{4} \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \cdot(-2) \cdot(-1) \cdot(-2)$$

$+1$, $+$, $+$

$$\left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & -\frac{1}{4} \\ 0 & \frac{3}{2} & -\frac{1}{2} & -4 & \frac{9}{2} \\ 0 & -\frac{3}{4} & \frac{1}{4} & 1 & \frac{9}{4} \\ 0 & \frac{3}{2} & \frac{1}{2} & -5 & \frac{15}{2} \end{array}\right] \cdot \frac{2}{3}$$

$$\left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & -\frac{1}{4} \\ 0 & 1 & -\frac{1}{3} & -\frac{8}{3} & 3 \\ 0 & -\frac{3}{4} & \frac{1}{4} & 1 & \frac{9}{4} \\ 0 & \frac{3}{2} & \frac{1}{2} & -5 & \frac{15}{2} \end{array}\right] \cdot\left(\frac{3}{4}\right) \cdot\left(\frac{1}{4}\right) \cdot\left(-\frac{3}{2}\right)$$

$+1$, $+$, $+$

$$\left[\begin{array}{cccc|c} 1 & 0 & \frac{1}{6} & -\frac{1}{6} & \frac{1}{2} \\ 0 & 1 & -\frac{1}{3} & -\frac{8}{3} & 3 \\ 0 & 0 & \frac{3}{2} & -\frac{3}{2} & \frac{9}{2} \\ 0 & 0 & 1 & -1 & 3 \end{array}\right] \cdot \frac{2}{3}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & \frac{1}{6} & -\frac{1}{6} & \frac{1}{2} \\ 0 & 1 & -\frac{1}{3} & -\frac{8}{3} & 3 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 1 & -1 & 3 \end{array}\right] \cdot(-1) \cdot\left(\frac{1}{3}\right) \cdot\left(-\frac{1}{6}\right)$$

$+1$, $+$, $+$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -3 & 4 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right] \cdot(-1)$$

$+1$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -3 & 4 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 1 & -3 \end{array}\right] \quad +\cdot 1 \quad +\cdot 3$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & -5 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & -3 \end{array}\right]$$

$x = 0$
$y = -5$
$z = 0$
$u = -3$

$4 \cdot 0 + 5 + 0 + 2 \cdot (-3) = -1$ ✓
$2 \cdot 0 - 5 - 3 \cdot (-3) = 4$ ✓
$0 + 5 + 2 \cdot 0 - 3 = 2$ ✓
$2 \cdot 0 - 5 + 0 - 4 \cdot (-3) = 7$ ✓

✓

RJEŠENJE JE:

$x = 0$
$y = 4 + 3\lambda$
$z = 3 + \lambda$, $\lambda \in \mathbb{R}$
$u = \lambda$

PROVJERITE DETERMINANTU MATRICE SUSTAVA!

IME I PREZIME: JURE ĐUSIĆ

BROJ INDEKSA: 17-1-0259-2014
026908 7878

1.) $z^3 - 6 + 7i = 0$

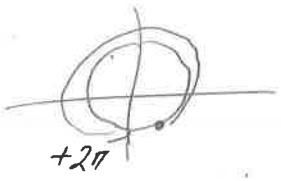
$z^3 = 6 + 7i$

$W_1 = 6 + 7i$

$|W_1| = \sqrt{6^2 + (-7)^2} = \sqrt{85}$

$\operatorname{tg} \varphi_1 = \frac{-7}{6} \Rightarrow \varphi = -0,8621700547$

$\varphi_1 = 5,4210152253$



$W_1 = \sqrt{85}\,(\cos(1 \cdot \varphi_1) + i \sin(1 \cdot \varphi_1))$

$W_1 = \sqrt{85}\,(\cos(1 \cdot 5,4210152253) + i \sin(1 \cdot 5,4210152253))$

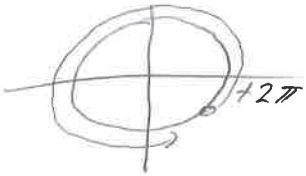
$W_1 = 6 - 7i$

$z^3 = 6 - 7i$

$z = \sqrt[3]{\sqrt{85}} \cdot \left(\cos \frac{\varphi_2 + 2k\pi}{3} + i \sin \frac{\varphi_2 + 2k\pi}{3}\right) \quad k = 0, 1, 2$

$\varphi_2 = \varphi_1 = -0,8621700547 + 2\pi$

$\varphi_2 = 5,4210152253$



$k = 0 \Rightarrow \sqrt[3]{\sqrt{85}} \cdot \left(\cos \frac{5,42 + 2 \cdot 0 \cdot \pi}{3} + i \sin \frac{5,42 + 2 \cdot 0 \cdot \pi}{3}\right)$

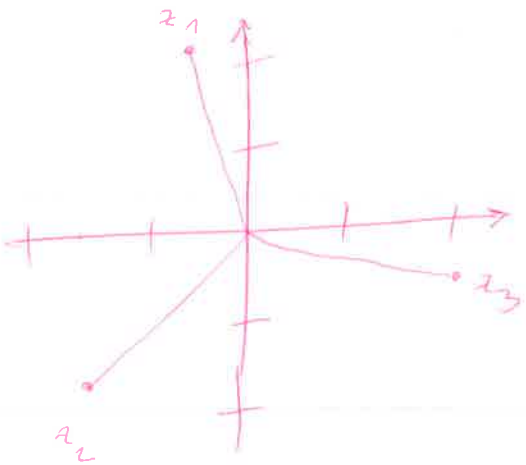
$k = 0 \Rightarrow -0,49 + 2,04\,i$

$k = 1 \Rightarrow \sqrt[3]{\sqrt{85}} \cdot \left(\cos \frac{5,42 + 2 \cdot 1 \cdot \pi}{3} + i \sin \frac{5,42 + 2 \cdot 1 \cdot \pi}{3}\right)$

$k = 1 \Rightarrow -1,52 - 1,44\,i$

$k = 2 \Rightarrow \sqrt[3]{\sqrt{85}} \cdot \left(\cos \frac{5,42 + 2 \cdot 2 \cdot \pi}{3} + i \sin \frac{5,42 + 2 \cdot 2 \cdot \pi}{3}\right)$

$k = 2 \Rightarrow 2,01 - 0,59\,i$



JURE ĐUSIĆ

2.) $g(x) = \sqrt{x^2+7}$

$$g'(x) = \frac{1}{2\sqrt{x^2+7}} + 2x = \frac{2x}{2\sqrt{x^2+7}}$$

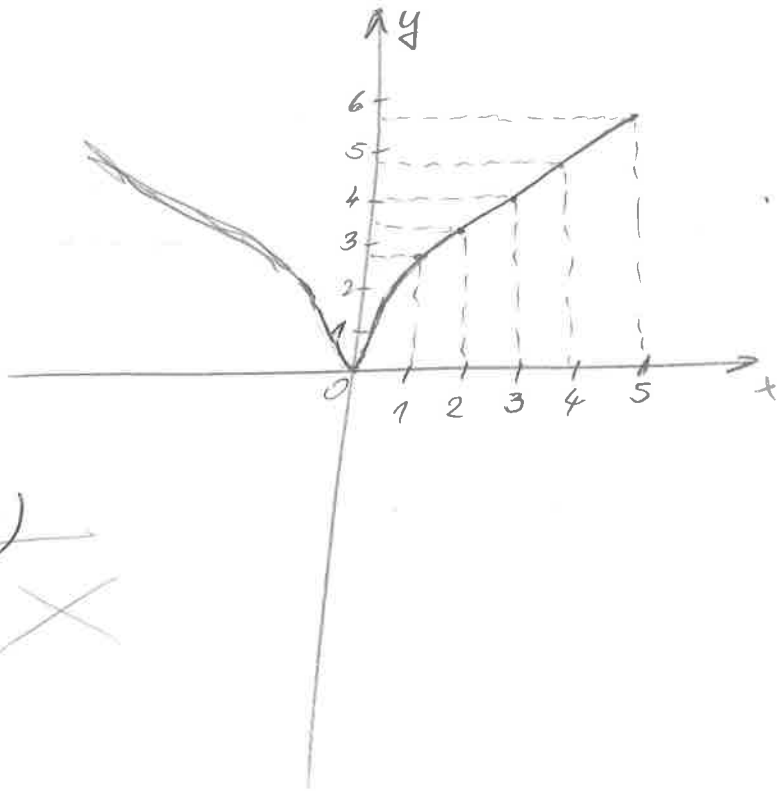
$$g''(x) = \frac{2\cdot 2\sqrt{x^2+7} - 2x\cdot \frac{1}{4\sqrt{x^2+7}}\cdot 2x}{(2\sqrt{x^2+7})^2} = \frac{4\sqrt{x^2+7} - \frac{4x}{4\sqrt{x^2+7}}}{4(x^2+7)}$$

$$g''(x) = \frac{4\sqrt{x^2+7} - \frac{x}{\sqrt{x^2+7}}}{4(x^2+7)}$$

$g'(x) = 0 \qquad 2x = 0$

$x = 0$

$g''(x) = 0$



	$-\infty$	0	$+\infty$
$g'(x)$	$-$	$+$	
$g''(x)$			
$g(x)$	↘	↗	
		min	

min (0, 0)

3.) $h(x) = \sqrt{x^2+2x}$

$x^2+2x \geq 0$

$x^2+2x+1 \geq 0$

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

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

$D(f) = \mathbb{R} \setminus \{-1\}$

VA ... $x = -1$

HA ...

$KA = ax+b = \frac{h(x)}{x} = \frac{\sqrt{x^2+2x}}{x} \; / : x^2 = \frac{x^2+2x : x^2}{x^2 : x^2} = \frac{1+\frac{2}{x}}{1} = 1$

$y_1 = 1 = x_1$

$y_2 = 2 = x_2$

$b = h(x) - ax = \sqrt{x^2+2x} - x \; / ^2 = x^2+2x-x^2 = 2x = 2$

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

$h''(x) = \frac{4x \cdot (2\sqrt{x^2+2x}) - 2x^2 \cdot \frac{1}{2\sqrt{x^2+2x}} \cdot 2x+2}{4(x^2+2x)} = \frac{8x\sqrt{x^2+2x} - \frac{x^2+2x+2}{\sqrt{x^2+2x}}}{4x^2+8x}$

$= \frac{x^2+6x+2}{4x^2+8x}$

$h'(x=0 \quad x^2 = 0 \Rightarrow x = 0$

$h''(x) = 0 \quad x^2+6x+2 = 0$

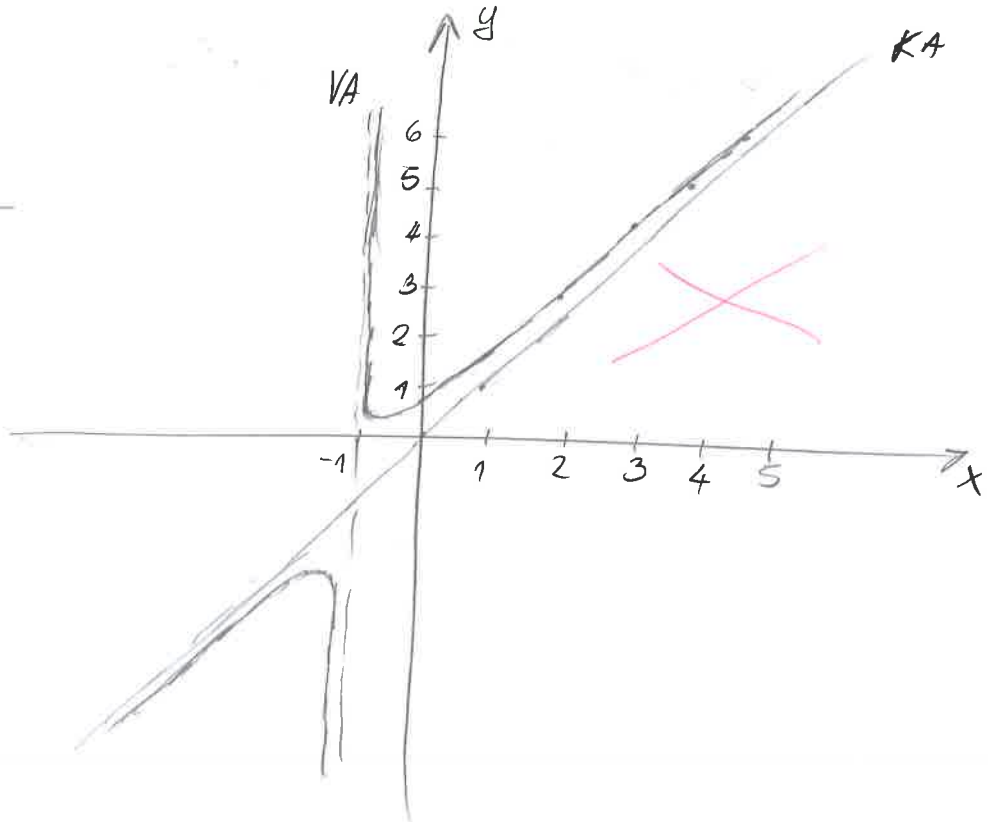
$x_{1/2} = \frac{-6 \pm \sqrt{36-8}}{2}$

$x_{1,2} = \frac{-6 \pm 2\sqrt{7}}{2}$

$x_1 = -0{,}35$

$x_2 = -5{,}65$

	$-\infty$	$-5{,}65$	$-0{,}35$	0	∞
$h'(x)$	+				
$h''(x)$					
$h(x)$					



MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ B2

IME I PREZIME: Mateo Bilaver **BROJ INDEKSA:** 17-2-0417-2014

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2+7}$ 10
3. Ispitati asimptote funkcije: $h(x) = \sqrt{x^2+2x}$. Zatim dovršiti ispitivanje toka i skicirati graf. 10(asimptote) 20(graf)
4. Odrediti i uvrštavanjem (kalkulator) provjeriti rezultat

   (a) $\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right) =$ 7+2

   (b) $\lim_{n\to\infty}\left(\frac{x^2+6}{x^2}\right) =$ 4+2
5. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje: 15+5

$$\begin{array}{rcrcrcr} 4x & - & y & + & z & + & 2u = & -1 \\ 2x & + & y & & & - & 3u = & 4 \\ x & - & y & + & 2z & + & u = & 2 \\ 2x & + & y & + & z & - & 4u = & 7 \end{array}$$

6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2-1))$. 10

Ukupno: 14

1.) $z^3 - 6 + 7i = 0$

$z^3 = (-6+7i)$ ×

$z^3 =$

$r = \sqrt{x^2+y^2}$

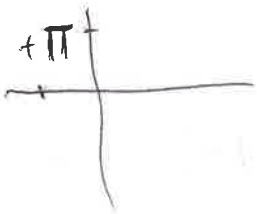
$r = \sqrt{-6^2+7^2}$

$r = \sqrt{13}$

$tg\,\varphi = \frac{y}{x}$

$tg\,\varphi = \frac{7}{-6}$

$tg\,\varphi = 4.00$



$\sqrt[n]{z} = \sqrt[n]{r}\left(\cos\frac{\varphi+2k\pi}{n} + i\sin\frac{\varphi+2k\pi}{n}\right)$

$\sqrt[3]{z} = \sqrt[3]{\sqrt{13}}\left(\cos\frac{4+2k\pi}{3} + i\sin\frac{4+2k\pi}{3}\right)$

$z_1 = \Rightarrow 1.533\,(0.2352 + 0.9719)$

$z_1 = k_0 \Rightarrow 0.3605 + 1.4899i$

$k_1 \Rightarrow 1.533\,(-0.9593 + (-0.2822)9)$

$k_1 \Rightarrow -1.47060 + (-0.43275)i$

$k_2 = 1.11 + (-1.05729)$

5.) $\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \sim \left[\begin{array}{cccc|c} \textcircled{1} & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \cdot(-2)+\text{II} \;/\cdot(-4)+\text{III} \;/\cdot(-2)+\text{IV}$

$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -4 & -5 & 0 \\ 0 & 3 & -7 & -2 & 6 \\ 0 & 3 & -3 & -7 & 3 \end{array}\right] /:3 \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & \textcircled{1} & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 3 & -7 & -2 & 6 \\ 0 & 3 & -3 & -7 & 3 \end{array}\right] \cdot 1+\text{I} \;/\cdot(-3)+\text{III} \;/\cdot(-3)+\text{IV}$

$\left[\begin{array}{cccc|c} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & -3 & \frac{2}{5} & 6 \\ 0 & 0 & 1 & -2 & 3 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & \textcircled{1} & -2 & 3 \\ 0 & 0 & -3 & \frac{2}{5} & 6 \end{array}\right] \cdot\left(-\frac{2}{3}\right)+\text{I} \;/\cdot\left(\frac{4}{3}\right)+\text{II} \;/\cdot 3+\text{IV}$

$\left[\begin{array}{cccc|c} 1 & 0 & 0 & \frac{2}{3} & 0 \\ 0 & 1 & 0 & -\frac{10}{3} & 4 \\ 0 & 0 & 1 & -2 & 3 \\ 0 & 0 & 0 & -\frac{28}{5} & 15 \end{array}\right] \text{obh} \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & \frac{2}{3} & 0 \\ 0 & 1 & 0 & -\frac{10}{3} & 4 \\ 0 & 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & \textcircled{1} & -\frac{28}{75} \end{array}\right] \sim$

$/:-\frac{28}{5}$

$\cdot\left(-\frac{2}{3}\right)+\text{II}$

$/\frac{10}{3}+\text{II}$

$/-2+\text{III}$

$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & \frac{56}{225} \\ 0 & 1 & 0 & 0 & \frac{234}{75} \\ 0 & 0 & 1 & 0 & \frac{287}{75} \\ 0 & 0 & 0 & 1 & -\frac{28}{75} \end{array}\right]$

PROJEKT?

2.) $g(x) = \sqrt{x^2+7}$

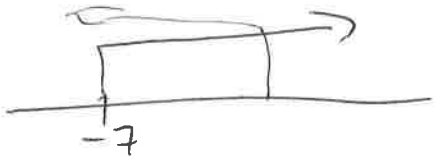
$x^2+7 \neq 0$

$x^2 = -7 \quad |^2$

$x = \pm\sqrt{7}$

$x^2+7 \geq 0$

$x^2 \geq -7$



$x \in [-7, 7]$?

IME I PREZIME: Mateo Bilaver BROJ INDEKSA: 17-2-0417-2014

6.) $\ln(\cos(2x-1))$

$f'(x) = \ln'(\cos(2x^2-1)) \cdot (\cos(2x^2-1))' \cdot (2x^2-1)$

$= \frac{1}{\cos(2x^2-1)} \cdot [-\sin(2x^2-1)] \cdot 2x$ ✓

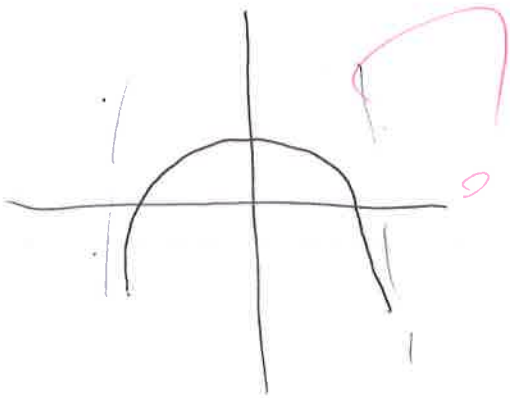
$= -2x\,tg(2x^2-1)$

4.) b.) $\lim_{n\to\infty} \left(\frac{x^2+6}{x^2} \right) = \frac{x^2+6 \,/:x^2}{x^2 /: x^2} = \frac{\frac{x^2}{x^2} + \frac{6}{x^2}}{\frac{x^2}{x^2}} = \frac{1}{1} = 1$ ✓

a.) $\lim_{x\to\infty} \left(\frac{\sqrt{7+x} - \sqrt{7}}{x} \right) = \frac{\sqrt{7+x} - \sqrt{7}}{x} \,/^2 = \frac{7+x^2-7}{x} \,/:x^2 = \frac{\frac{7}{x^2} + \frac{x^2}{x^2} - \frac{7}{x^2}}{\frac{x}{x^2}} = \frac{1}{0} = -\infty$

3.) $h(x) = \sqrt{x^2+2x}$

$\sqrt{x^2+2}$



MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ B2

IME I PREZIME: Ante Jerolimov **BROJ INDEKSA:** 47-2-0122-2011

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
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6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2 - 1))$. 10

Ukupno: 14

(6) $= \frac{1}{\cos(2x^2-1)} \cdot (-\sin(2x^2-1)) \cdot 4x$ ✓

(3) $h(x) = \sqrt{x^2+2x}$

$x^2 + 2x \geq 0$

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

$x_{1,2} = \frac{2}{2}$

$x_1 = 1$

$Df = \mathbb{R} \setminus \{1\}$

$= \langle -\infty, 1 \rangle \cup \langle 1, +\infty \rangle$

rubovi domene

$VA: \lim_{x \to 1_+} \sqrt{x^2+2x} = \sqrt{1+2} = \sqrt{3} \to$ Nije VA

$\lim_{x \to 1_-} \sqrt{x^2+2x} = \sqrt{1_- + 2_+} = \sqrt{3}$

D

$HA: \lim_{x \to +\infty} \sqrt{x^2+2x} = \sqrt{\infty+\infty} = \infty + \infty = \lim_{x \to +\infty} \sqrt{x^2+2x} \cdot \frac{\sqrt{x^2-2x}}{\sqrt{x^2-2x}}$

$= \lim_{x \to +\infty} \frac{x^2+2x+x^2-2x}{\sqrt{x^2-2x}} \Big/ \cdot x^2 = \lim_{x \to +\infty} \frac{\frac{x^2}{x^2} + \frac{2x}{x^2} + \frac{x^2}{x^2} - \frac{2x}{x^2}}{\sqrt{\frac{x^2}{x} - \frac{2x}{x}}} = \frac{2}{0} = 2$

D

$y = 2$ HA ✗

LHA: $\lim_{x \to -\infty} \sqrt{x^2+2x} = \left\{ \begin{matrix} x \to -x \\ -\infty \to +\infty \end{matrix} \right\} = \lim_{x \to +\infty} \sqrt{(-x)^2+2\cdot(-x)} = \infty - \infty$ Nema

KOSE Nema ✓

Nul točke = $x^2+2x=0$

$x_1=1$

Prva derivacija

=

(5)

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \leftrightarrow \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \begin{matrix} \\ 2R-2R_1 \\ 3R-4R_1 \\ 4R-2R_1 \end{matrix} \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & -3 & -4 & -5 & 0 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 3 & -7 & -6 & 3 \end{array}\right] \cdot \left(-\frac{1}{3}\right)$$

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 3 & -7 & -6 & 3 \end{array}\right] \begin{matrix} R_1+R_2 \\ \\ R_3-3R_2 \\ R_4-3R_2 \end{matrix} \left[\begin{array}{cccc|c} 1 & 0 & -\frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & -\frac{12}{3} & \frac{13}{3} & -9 \\ 0 & 0 & -\frac{12}{3} & -\frac{9}{3} & 3 \end{array}\right] \begin{matrix} \\ \\ \cdot(-1) \\ \cdot\left(-\frac{3}{12}\right) \end{matrix} \left[\begin{array}{cccc|c} 1 & 0 & -\frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & 1 & -\frac{39}{27} & -27 \\ 0 & 0 & -\frac{12}{3} & 1 & \\ & & & 1 & \end{array}\right]$$

④ $\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right)=\lim_{x\to 0}\left(\frac{\sqrt{7+0}-\sqrt{7}}{0}\right)=\frac{\sqrt{7}-\sqrt{7}}{0}=\frac{0}{0}$ C'H

C'H $\lim_{x\to 0}\left(\frac{1}{\frac{\sqrt{7+x}}{1}}\right)=\frac{1}{\sqrt{7+x}}=\frac{1}{\sqrt{7}}$

Ante Jerolimov

$\left(\sqrt{7+x}\right)'=\frac{1}{2\sqrt{7+x}}$

⑥ $\lim_{x\to\infty}\left(\frac{x^2+6}{x^2}\right)=\left(\frac{\infty}{\infty}\right)\overset{C'H}{=}\frac{2x}{2x}=1$ ✓

---

① $z^3-6+7i=0$

$z^3=6-7i$

$r=\sqrt{x^2+y^2}$

$=\sqrt{36-49i}$

$=\sqrt{13}i$ ×

② $gx=\sqrt{x^2+7}$

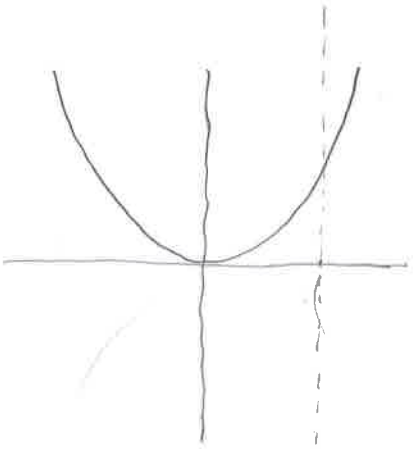
$Dp=x^2+7\geq 0$

$x_{1,2}=\frac{0\pm\sqrt{0-28}}{2}$

$x_{1,2}=\frac{5,3}{2}$ $x_2=-\frac{5,3}{2}$

$x_1=2,65$ ~~$x_2=2,65$~~ mora biti veće ili jednako nuli

	$-\infty$	1	2,65	3	$+\infty$
$g(x)$		+	+		



VA $\lim_{x\to 2,65^+}\sqrt{(2,65)^2+x}=\sqrt{14,0225}=3,7$ Nije VA.

Fja – nije periodična jer ne sadrži (sin, cos, tan, cot)

GLOBALNI EKSTREMI ?

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇓⇓ B2

IME I PREZIME: SANDRO-LEON BUŠIĆ **BROJ INDEKSA:** 17-1-0240-14 02690037607

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 7}$ 10
3. Ispitati asimptote funkcije: $h(x) = \sqrt{x^2 + 2x}$. Zatim dovršiti ispitivanje toka i skicirati graf. 10(asimptote) 20(graf)
4. Odrediti i uvrštavanjem (kalkulator) provjeriti rezultat

   (a) $\lim_{x \to 0} \left(\frac{\sqrt{7+x} - \sqrt{7}}{x} \right) =$ 7+2

   (b) $\lim_{n \to \infty} \left(\frac{x^2 + 6}{x^2} \right) =$ 4+2

5. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje: 15+5

$$\begin{array}{rcrcrcrcl} 4x & - & y & + & z & + & 2u & = & -1 \\ 2x & + & y & & & - & 3u & = & 4 \\ x & - & y & + & 2z & + & u & = & 2 \\ 2x & + & y & + & z & - & 4u & = & 7 \end{array}$$

6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2 - 1))$. 10

Ukupno: 47

1.) $z^3 = 6 + 7i \mid \sqrt[3]{\ }$

$z = \sqrt[3]{6 + 7i}$

$r = \sqrt{6^2 + 7^2}$

$r = \sqrt{85}$

$\operatorname{tg} f = \frac{7}{6}$

$f = 0,8622$

$\sqrt[3]{z} = \sqrt[3]{n} \left(\cos\left(\frac{f + 2k\pi}{3} \right) + i \cdot \sin\left(\frac{f + 2k\pi}{3} \right) \right)$

$k = 0, 1, 2$

$k = 0 \Rightarrow \sqrt[3]{\sqrt{85}} \left(\cos\left(\frac{0,8622 + 2 \cdot 0\pi}{3} \right) + i \cdot \sin\left(\frac{0,8622 + 2 \cdot 0\pi}{3} \right) \right)$

$= 2,01 + 0,59i$ //

$k = 1 \Rightarrow \sqrt[3]{\sqrt{85}} \left(\cos\left(\frac{0,8622 + 2 \cdot 1\pi}{3} \right) + i \cdot \sin\left(\frac{0,8622 + 2 \cdot 1\pi}{3} \right) \right)$

$= -0,49 + 2,04i$ //

$k = 2 \Rightarrow \sqrt[3]{\sqrt{85}} \left(\cos\left(\frac{0,8622 + 2 \cdot 2\pi}{3} \right) + i \cdot \sin\left(\frac{0,8622 + 2 \cdot 2\pi}{3} \right) \right)$

$= -1,87 - 0,45i$ //

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

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

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

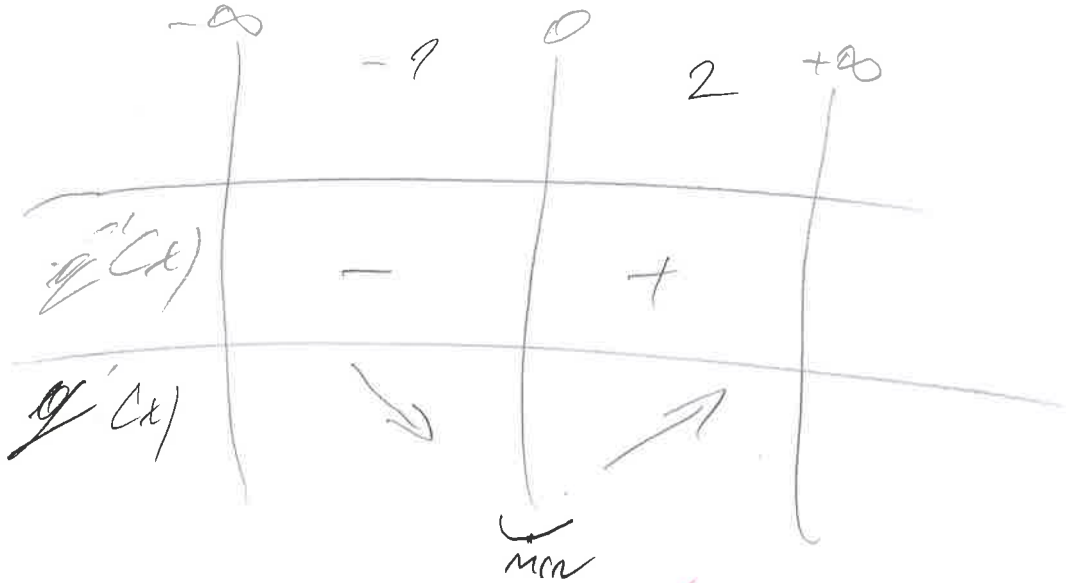
$= \frac{2x}{2\sqrt{x^2+2x}}$

$f'(x) = 0$

$\frac{2x}{2\sqrt{x^2+2x}} = 0 \;/ : 2\sqrt{x^2+2x}$

$2x = 0$

$x = 0$



MIN = 0 //

SANDRO-LEON BUŠLJETA

$$\left[\begin{array}{cccc|c} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & -3 & 3 & -4 \end{array}\right] \; / \cdot\left(-\tfrac{2}{3}\right)+\text{II} \; / \cdot\tfrac{4}{3}+\text{III} \; / \cdot 3+\text{IV}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -3 & 4 \\ 0 & 0 & 1 & -3 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

MATRICA NEMA RJEŠENJE

VIDI ŠAKANOVIĆ

6.) $f(x) = \ln(\cos(2x^2-1))$

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

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

$$f'(x) = \frac{\div 4 \sin x}{\cos(2x^2-1)}$$

7.) ASIMTOTE VERTIKALNE NEMA JER DOMENA

D. H. A $\lim\limits_{x\to\infty} \sqrt{x^2+2} = \infty$

L. H. A $\lim\limits_{x\to-\infty} \sqrt{x^2+2} = \infty$

K. A $k(x) = \frac{f(x)}{x}$ $\quad l = \lim\limits_{x\to\infty}[f(x) - k(x)]$

$$k(x) = \frac{\sqrt{x^2+2}}{x}$$

SANDRO-LEON BUSLUEVA

3) $h(t) = \sqrt{t^2 + 2t}$

$t^2 + 2t \geq 0$

$2t^3 \geq 0$

$t^3 \geq 2$

$t \geq \sqrt[3]{2}$ Df ∈ R

5)

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right]$$

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \begin{array}{l} \\ \cdot(-2)+II \\ \cdot(-4)+III \\ \cdot(-2)+IV \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -4 & -5 & 0 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \begin{array}{l} \\ :3 \\ \\ \\ \end{array} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \begin{array}{l} \\ \\ \cdot(-3)+III \\ \cdot(-3)+IV \end{array}$$

$$\left[\begin{array}{cccc|c} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & -3 & 3 & -9 \\ 0 & 0 & 1 & -1 & 3 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 0 & \frac{2}{3} & -\frac{2}{3} & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & -3 & 3 & -9 \end{array}\right]$$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ B2

IME I PREZIME: Antonio Jović **BROJ INDEKSA:** 0269076958

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

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3. Ispitati asimptote funkcije: $h(x) = \sqrt{x^2 + 2x}$. Zatim dovršiti ispitivanje toka i skicirati graf. 10(asimptote) 20(graf)

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6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2 - 1))$. 10

Ukupno: 20 5

5. Antonio Jurić

$$\begin{aligned} 4x - y + z + 2u &= -1 \\ 2x + y - 3u &= 4 \\ x - y + 2z + u &= 2 \\ 2x + y + z - 4u &= 7 \end{aligned}$$

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \begin{matrix} \\ \\ \\ (\cdot(-4)+\text{III}) \end{matrix}$$

$$\sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \begin{matrix} \\ \\ (\cdot(-2)+\text{III}) \\ \\ \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & -3 & -1 & 8 & -15 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \begin{matrix} \\ \\ \\ (\cdot(-2)+\text{II}) \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & -3 & -1 & 8 & -15 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \sim$$

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 0 & -4 & 2 & -12 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \begin{matrix} \\ \\ (:-2) \\ (:3) \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 0 & 2 & -1 & 6 \\ 0 & 1 & -1 & -2 & 1 \end{array}\right] \begin{matrix} \\ \\ \\ \text{IV}+\text{II} \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -2 & -1 & -2 \\ 0 & 0 & 2 & -1 & 6 \\ 0 & 1 & -1 & -2 & 1 \end{array}\right] \sim$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & -2 & -1 & -2 \\ 0 & 0 & 2 & -1 & 6 \\ 0 & 1 & -1 & -2 & 1 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & 0 & -2 & 4 \\ 0 & 0 & 2 & -1 & 6 \\ 0 & 1 & -1 & -2 & 1 \end{array}\right] \begin{matrix} \\ \\ \\ (\cdot(-1)+\text{IV}) \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & 0 & -2 & 4 \\ 0 & 0 & 2 & -1 & 6 \\ 0 & 0 & -1 & 0 & -3 \end{array}\right] \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & 0 & -2 & 4 \\ 0 & 0 & -1 & 0 & -3 \\ 0 & 0 & 2 & -1 & 6 \end{array}\right] \begin{matrix} \\ \\ \\ )+ \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & 0 & -2 & 4 \\ 0 & 0 & -1 & 0 & -3 \\ 0 & 0 & 1 & -1 & 3 \end{array}\right] \begin{matrix} \\ \\ (\cdot -1) \\ \cdot(-1) \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & 0 & -2 & 4 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right] \begin{matrix} \sim \\ \\ \\ +\text{III} \end{matrix}$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -2 & 4 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & -2 & 4 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 & 0 \end{array}\right] \begin{matrix} \\ \\ \\ (+2)+\text{II} \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 4 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 & 0 \end{array}\right]$$

$$\begin{bmatrix} x \\ y \\ z \\ u \end{bmatrix} = \begin{bmatrix} 0 \\ 4 \\ 3 \\ 0 \end{bmatrix}$$

$x=0$
$y=4$
$z=3$
$u=0$

provjera:

$4x - y + z + 2u = -1$

$4\cdot 0 - 4 + 3 + 2\cdot 0 = -1$

$-1 = -1$ /

Matrica inv a ovisnja za sve nepoznanice!

PROVJERITE DETERMINANTU MATRICE SUSTAVA => IMA JOŠ RJEŠENJA!

$2x + y - 3u = 4$

$0 + 4 - 0 = 4$

$4 = 4$ /

$x - y + 2z + 4 = 2$

$0 - 4 + 6 + 0 = 2$

$2 = 2$ /

$2x + y + z - 4u = 2$

$0 + 4 + 3 - 0 = 2$

$2 = 2$ ✓

4.

a) $\lim_{x \to 0} \left(\frac{\sqrt{7+x} - \sqrt{7}}{x} \right)$ ⚠

$\lim_{x \to 0^+} \left(\frac{\sqrt{7+0^+} - \sqrt{7}}{0^+} \right) = +\infty$

$\lim_{x \to 0^-} \left(\frac{\sqrt{7+0^-} - \sqrt{7}}{0^-} \right) = +\infty$ /

provjera:

$\lim \left(\frac{\sqrt{7+0,01} - \sqrt{7}}{0,01} \right) = 0,189$

$\lim \left(\frac{\sqrt{7+0,01} - \sqrt{7}}{-0,01} \right) = 0,189$

NIJE LI ČUDNO.

3.

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

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

$Df \in \langle -\infty, -2] \cup [0, +\infty \rangle$

$\sqrt{x^2+2x} = 0 \ / ^2$

$x^2 + 2x = 0$

$x(x+2) = 0$

$x_1 = 0$

$x_2 = -2$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ B2

IME I PREZIME: JURE IVKOVIĆ **BROJ INDEKSA:** 17-2-03397-2014

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

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6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2 - 1))$. 10

Ukupno:

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ B2

IME I PREZIME: MATEJ BERETIN

BROJ INDEKSA: 001245

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

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IME I PREZIME: MARKO ČUDINA **BROJ INDEKSA:** 57664-2009

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 6 + 7i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
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3. Ispitati asimptote funkcije: $h(x) = \sqrt{x^2+2x}$. Zatim dovršiti ispitivanje toka i skicirati graf. 10(asimptote) 20(graf)
4. Odrediti i uvrštavanjem (kalkulator) provjeriti rezultat

   (a) $\lim_{x\to 0}\left(\frac{\sqrt{7+x}-\sqrt{7}}{x}\right) =$ 7+2

   (b) $\lim_{n\to\infty}\left(\frac{x^2+6}{x^2}\right) =$ 4+2

5. Riješi sustav Gaussovom metodom i obavezno provjeri rješenje: 15+5

$$\begin{array}{rcrcrcr} 4x & - & y & + & z & + & 2u = & -1 \\ 2x & + & y & & & - & 3u = & 4 \\ x & - & y & + & 2z & + & u = & 2 \\ 2x & + & y & + & z & - & 4u = & 7 \end{array}$$

6. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\cos(2x^2-1))$. 10

Ukupno: ∅

5. $4x - y + z + 2u = -1$
$2x + y - 3u = 4$
$x - y + 2z + u = 2$
$2x + y + z - 4u = 7$

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \overset{II-IV}{\sim} \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 4 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \sim$$