MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: Roko Šimurina **BROJ INDEKSA:** 17-1-0029-2010

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2+3}$ 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) $\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right) =$ 7+2

   (b) $\lim_{n\to\infty}\left(\frac{x^2+5}{x^2}\right) =$ 4+2

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

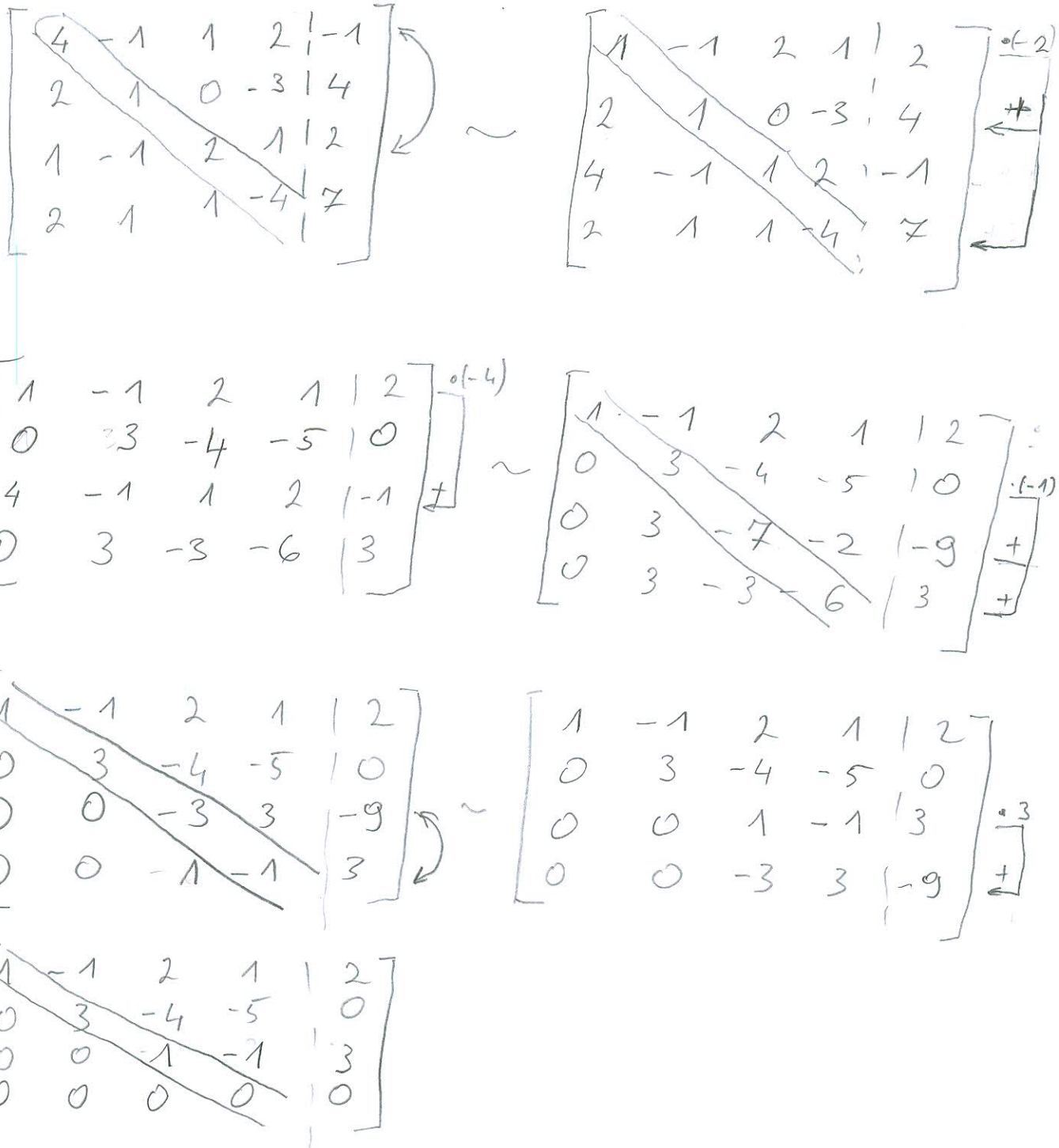
$$\begin{array}{rcrcrcrcr} 4x & - & y & + & z & + & 2u & = & -1 \\ 2x & + & y & & & - & 3u & = & 4 \\ x & - & y & + & 2z & + & u & = & 2 \\ 2x & + & y & + & z & - & 4u & = & 7 \end{array}$$

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

Ukupno: 54

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

5.



Roko Šimurina

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

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

$x^2+3 \geq 0$

$x^2 \geq -3$

$g'(x) = \frac{x}{\sqrt{x^2+3}}$

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

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

$g(0) = \sqrt{3}$

$\min(0, \sqrt{3})$ ✓

4.

a) $\lim_{x \to 0} \left(\frac{\sqrt{3+x} - \sqrt{3}}{x} \right) = ?$ 0

b) $\lim_{n \to \infty} \left(\frac{x^2+5}{x^2} \right) \overset{/:x^2}{=} \left[\frac{\infty}{\infty} \right] = \lim_{n \to \infty} \frac{1+\frac{5}{x^2}}{1} = 1$ ✓

$h(x) = 0 \Rightarrow \sqrt{x^2+2x} = 0$

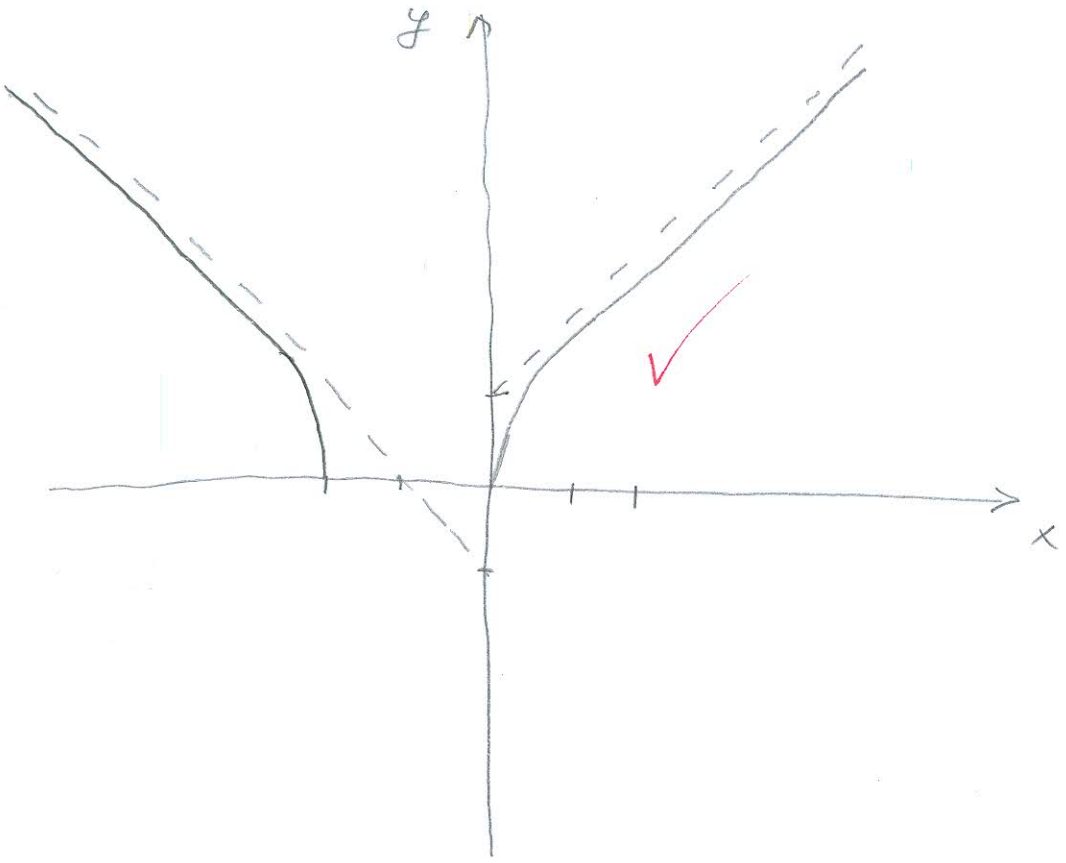
$x = 0 \quad x = -2$

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

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

$h'(x) = 0 \Rightarrow x+1 = 0$

$x = -1$



Roko Simurina

3.

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

	$-\infty$		-2		0		$+\infty$
x^2+2x		+		−		+	

$x^2 + 2x \geq 0$

$x(x+2) \geq 0$

$x_1 = 0 \quad x_2 = 0$

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

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

Nema V. A

$\lim_{x \to -\infty} \sqrt{x^2+2x} = \infty$ Nema H. A.

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

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

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

LKA ... $y = -x - 1$ ✓

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

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

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

DKA ... $y = x + 1$ ✓

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: ANTONIO ŠARIN **BROJ INDEKSA:** 17-2-0301-13

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
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$$\begin{array}{rcrcrcrcr} 4x & - & y & + & z & + & 2u & = & -1 \\ 2x & + & y & & & - & 3u & = & 4 \\ x & - & y & + & 2z & + & u & = & 2 \\ 2x & + & y & + & z & - & 4u & = & 7 \end{array}$$

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

Ukupno: 49

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

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

$= \frac{x}{\sqrt{x^2+3}}$

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

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

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

$g''(0) = \sqrt{\frac{3}{3}} > 0$ MINIMUM

$T(0, \sqrt{3})$ MINIMUM

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

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

$= -4x\cdot g(2x^2-1)$ ✓

4) a) $\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right)\cdot\frac{\sqrt{3+x}+\sqrt{3}}{\sqrt{3+x}+\sqrt{3}}$

$= \lim_{x\to 0}\frac{3+x-3}{x(\sqrt{3+x}-\sqrt{3})} =$

$= \lim_{x\to 0}\frac{1}{\sqrt{3+x}+\sqrt{3}} = \frac{1}{2\sqrt{3}}$ // ✓

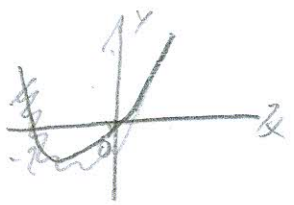
b) $\lim_{x\to\infty}\left(\frac{x^2+5}{x^2}\right) =$ (L'HOSPITAL)

$= \lim_{x\to\infty}\frac{2x}{2x} = 1$ // ✓

3) $h(x) = \sqrt{x^2+2x}$ $\quad x_1 = 0$ $\quad x_2 = -2$

$x^2+2x \geq 0$

$x(x+2) \geq 0$



$D_h(x) \in \langle -\infty, -2] \cup [0, +\infty \rangle$

1) VERTIKALE ASIMPTOTE NEMA

2) HORIZONTALNE ASIMPTOTE

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

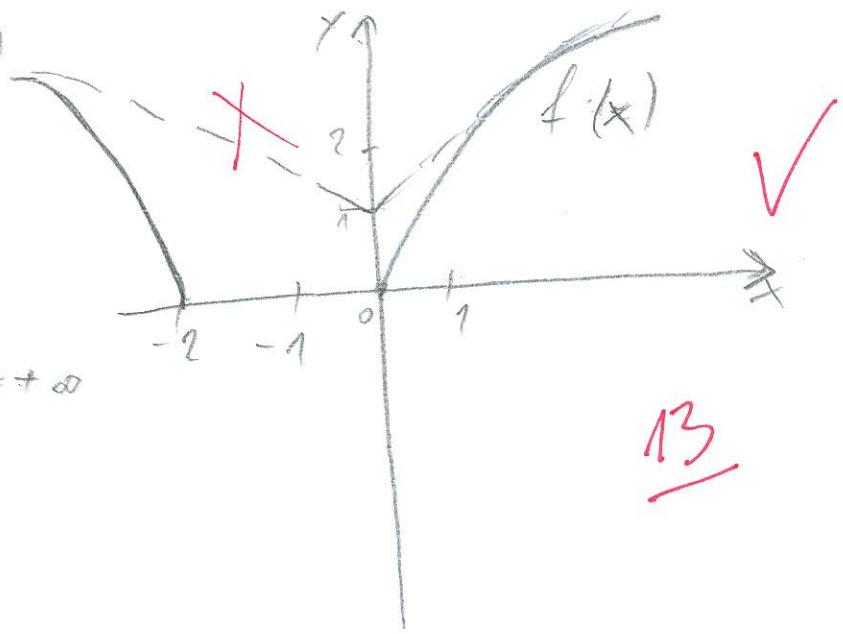
$\lim_{x\to-\infty}\sqrt{x^2+2x} = \lim_{x\to+\infty}\sqrt{x^2-2x} = +\infty$

NEMA HORIZONTALNE

KOSI

$k = \lim_{x\to\infty}\frac{\sqrt{x^2+2x}}{x}\ \begin{matrix}:x\\ :x\end{matrix} =$

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



✗ ✓

13

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

$$= \lim_{x \to \infty} \frac{x^2 + 2x - x^2}{\sqrt{x^2 + 2x} + x} \; \Big| \; x \qquad = 1$$

$$\sqrt{x^2 + 2x} + x \; \Big| \; x$$

DESNA KOSA: $y = x + 1$

LIJEVA KOSA?

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: Saša Pelc **BROJ INDEKSA:** 0269082855

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 3}$ 10
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   (a) $\lim_{x \to 0} \left(\frac{\sqrt{3+x} - \sqrt{3}}{x} \right) =$ 7+2

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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: 36

5) $4x - y + z + 2u = 1$

$2x + y - 3u = 4$

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

$2x - y + z - 4u = 7$

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

$$\left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ 0 & \frac{3}{2} & -\frac{1}{2} & -4 & \frac{7}{2} \\ 0 & -\frac{3}{4} & \frac{7}{4} & \frac{1}{2} & \frac{9}{4} \\ 0 & \frac{3}{2} & \frac{1}{2} & -3 & \frac{15}{2} \end{array}\right] \cdot\frac{2}{3} \sim \left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ 0 & 1 & -\frac{1}{3} & -\frac{8}{3} & 3 \\ 0 & -\frac{3}{4} & \frac{7}{4} & \frac{1}{2} & \frac{9}{4} \\ 0 & \frac{3}{2} & \frac{1}{2} & -3 & \frac{15}{2} \end{array}\right] \cdot\frac{1}{6} \cdot\left(-\frac{3}{4}\right) \cdot(-1)$$

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

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

PROVJERA

$0 - 4 + 3 + 0 = -1$

$0 + 4 - 0 = 4$

$0 - 4 + 6 = 2$

$0 + 4 + 3 - 0 = 7$

$x = 0 \rightarrow y = 4 + 3u$

$y - 3u = 4$

$z - u = 3$

BEŠKONAČNO RJEŠENJA..

$x = 0$

$y = 4$

$z = 3$

$u = 0$

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

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

$x = -1 \quad (-1, +\infty)$

$h(x) = 0$

$2x + 2 = 0$

$2x = -2$

$x = -1$

min $(-1, +\infty)$

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

$$k = \lim_{x\to\infty} \frac{f(x)}{x} = \lim_{x\to\infty} \frac{\sqrt{x^2+2x}}{x} = \lim_{x\to\infty} \sqrt{\frac{x^2+2x}{x^2}} \Big/ x^2 = \lim_{x\to\infty} \sqrt{1+\frac{2}{x}} \to 0$$

$k = 1$

$$l = \lim_{x\to\infty} (f(x) - (x)) = \lim_{x\to\infty} \left(\sqrt{x^2+2x} - x\right) = \text{L'H} \lim_{x\to\infty} \left(\frac{1}{2} \cdot \frac{1}{\sqrt{x^2+2x}} \cdot (2x+2)\right)$$

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

NULTOČKE

$h(x) = 0$

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

$x^2 + 2x = 0$

$x(x+2) = 0$

P. $y = x$ $(x=0)$ $(k=1)$

MATEMATIKA I

izvanredni student nautike
Saša Pelc

2.) $g(x) = \sqrt{x^2+3} = (x^3+3)^{\frac{1}{2}}$

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

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

$g'(x) = 0$

$\frac{3}{2}x^2 \cdot \frac{1}{\sqrt{x^3+3}} = 0$

$x = 0 \rightarrow (0, \sqrt{3})$ ✓

$g(0) = \sqrt{3}$

4.) a) $\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right) = \sqrt{3}-\sqrt{3} = 0$

$\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right) = L'H = \lim \frac{\frac{1}{2}\cdot\frac{1}{\sqrt{3+x}}-0}{1} = \frac{1}{2\sqrt{3}}$ ✓

b) $\lim_{n\to\infty}\left(\frac{x^2+5x}{x^2}\right) = \lim \frac{1+\frac{5}{x^2}}{1} = 1$ ✓

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

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

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

1) $z^3 = 5 - 3i$

$r = \sqrt{25+9}$

$r = 5$

$\varphi = \operatorname{arctg}\left(-\frac{3}{5}\right) - 30{,}96°$

$z^3 = 5(\cos(-30{,}96) + i\sin(-30{,}96))$

$z = 5\left(\cos\frac{-30{,}96+2k\pi}{3} + i\sin\left(\frac{-30{,}96+2k\pi}{3}\right)\right)$?

$z_1 = 5\left(\cos\frac{-30{,}96}{3} + i\sin\left(\frac{-30{,}96}{3}\right)\right)$

$z_2 = 5\left(\cos\frac{-24{,}96}{3} + i\sin\left(\frac{-24{,}96}{3}\right)\right)$

$z_3 = 5\left(\cos\frac{-12{,}96}{3} + i\sin\left(\frac{-12{,}96}{3}\right)\right)$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: MIŠEL GOBIN

BROJ INDEKSA: 17-1-0034-2010

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *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: 31

4. a) $\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right)$

$= \frac{\sqrt{3+x}+\sqrt{3}}{\sqrt{3+x}+\sqrt{3}}$

$\lim_{x\to 0} \frac{3+x-3}{x(\sqrt{3+x}+\sqrt{3})}$

$= \lim_{x\to 0} \frac{1}{\sqrt{3+x}+\sqrt{3}} = \frac{1}{2\sqrt{3}}$ ✓

b) $\lim_{n\to\infty}\left(\frac{x^2+5}{x^2}\right) = (\text{L'HOSPITAL})$

$= \lim_{x\to+\infty} \frac{2x}{2x} = 1$ ✓

② $g(x)=\sqrt{x^2+3}$

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

$$=\frac{x}{\sqrt{x^2+3}}$$

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

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

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

$g''(0)=\frac{\sqrt{3}}{3}>0$ MINIMUM

$T(0,\sqrt{3})$ MINIMUM ✓

⑥ $f(x)=\ln(\cos(2x^2-1))$

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

$$=-4x\,\mathrm{tg}(2x^2-1)$$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: KARLO FRANOV **BROJ INDEKSA:** 17-2-0311-2013

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
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   (b) $\lim_{x\to\infty}\left(\frac{x^2+5}{x^2}\right) = \lim_{x\to\infty} \frac{x^2+5}{x^2}$ 4+2
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: 25

1. $z^3 - 5 + 3i = 0$

$z^3 = 5 - 3i \;/\cdot \sqrt[3]{\;}$

$z = \sqrt[3]{5-3i}$

$|z| = \sqrt{x^2+y^2} = \sqrt{5^2+(-3)^2} = \sqrt{25+9} = \sqrt{34}$

$\operatorname{tg}\varphi = \frac{y}{x} = -0{,}5104$ IV KVADRANT

$k=0 \Rightarrow z = \sqrt[3]{\sqrt{34}}\cdot\left(\cos\frac{-0{,}5104\,\pi}{3} + i\sin\frac{-0{,}5104\,\pi}{3}\right)$

$k=1 \Rightarrow z = \sqrt[3]{\sqrt{34}}\left(\cos\frac{-5{,}7692}{3} + i\sin\frac{-5{,}7692}{3}\right)$ ✗

$k=2 \Rightarrow z = \sqrt[3]{\sqrt{34}}\left(\cos\frac{-6{,}4139}{3} + i\sin\frac{-6{,}4139}{3}\right)$

6. $f(x) = \operatorname{tg}(\cos(2x^2-1))$

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

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

5.
$$\begin{aligned} 4x - y + z + 2u &= -1 \\ 2x + y + 0 - 3u &= 4 \\ x - y + 2z + u &= 2 \\ 2x + y + z - 4u &= 7 \end{aligned}$$

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

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

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

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

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

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

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{6}{5} & \frac{7}{2} \\ 0 & 1 & 0 & -\frac{3}{5} & -3 \\ 0 & 0 & 1 & \frac{5}{4} & -\frac{9}{4} \\ 0 & 0 & 0 & -\frac{21}{4} & 12 \end{array}\right] \quad :\left(-\frac{21}{4}\right)$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & -\frac{6}{5} & \frac{7}{2} \\ 0 & 1 & 0 & -\frac{3}{5} & -3 \\ 0 & 0 & 1 & \frac{5}{4} & -\frac{9}{4} \\ 0 & 0 & 0 & 1 & -\frac{20}{7} \end{array}\right] \quad \cdot\left(\frac{6}{5}\right) \quad \cdot\left(\frac{3}{5}\right) \quad \cdot\left(-\frac{5}{4}\right)$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & \frac{1}{14} \\ 0 & 1 & 0 & 0 & -\frac{33}{7} \\ 0 & 0 & 1 & 0 & \frac{1}{28} \\ 0 & 0 & 0 & 1 & -\frac{20}{7} \end{array}\right] \quad \begin{matrix} x \\ y \\ z \\ u \end{matrix}$$

4 a) $\lim_{x\to 0} \frac{\sqrt{3+x}-\sqrt{3}}{0} = \frac{\sqrt{3}-\sqrt{3}}{0} = \frac{0}{0} = 0 = \lim_{x\to 0} \frac{\frac{1}{2\sqrt{3+x}}}{1} = \frac{1}{2\sqrt{3}}$ ✓ KARLO FRANOV

UVRŠTAVANJEM 0 U IZRAZ DOBIVAMO OBLIK $\frac{0}{0}$ KOJI UKAZUJE NA NEODREĐENOST.

PRIMJENJUJEMO L'HOSPITALOVO PRAVILO ZA ODREĐIVANJE LIMESA DERIVIRAMO NAZIVNIK I NAZIVNIK

$\lim_{x\to\infty} \left(\frac{x^2+5}{x^2}\right) = \lim_{x\to\infty} \frac{x^2+5 \mid :x^2}{x^2 \mid :x^2} = \frac{5}{1} = 5$ ✗

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

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

$\frac{x}{\sqrt{x^2+2}} = 0 \Rightarrow x = 0$

$g(0) = \sqrt{0+3} = \sqrt{3}$

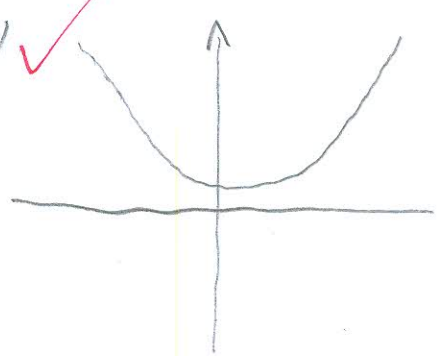
$\lim_{x\to\infty} g(x) = \lim_{x\to\infty} \sqrt{x^2+3} = \infty$

$\lim_{x\to-\infty} g(x) = \lim_{x\to\infty} \sqrt{x^2+3} = \infty$

} NEMA MAKSIMUM

GLOBALNI MINIMUM

$T(0, \sqrt{3})$ ✓



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

$k = \lim_{x\to\infty} \frac{\sqrt{x^2+2x}}{x} = \lim_{x\to\infty} \frac{\sqrt{1+0}}{1} = 1 \checkmark \Rightarrow k = 1$

$l = \lim_{x\to\infty} (f(x) - kx) = \lim_{x\to\infty} (\sqrt{x^2+2x} - x) = ?$

$l = \lim_{x\to-\infty} (f(x) - kx) = -1$

$y = x+1$ NEMA KOSE ASIMPTOTE ?

$y = -x-2$ NEMA KOSE ASIMPTOTE ?

DOMENA PO

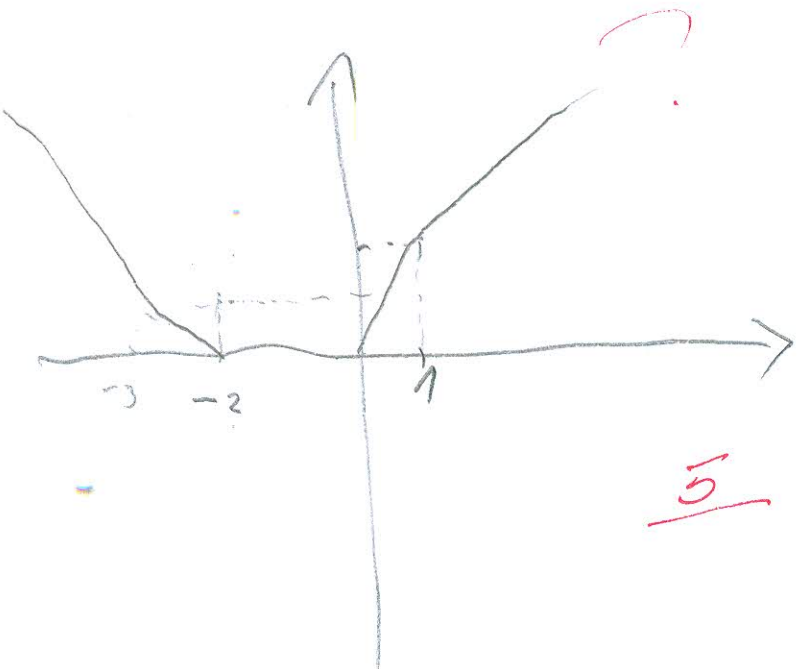
$x^2+2x \geq 0$

$x(x+2) = 0$

$x_1 = 0$

$x_2 = -2$

$D_f = \langle -\infty, -2] \cup [0, +\infty \rangle$?



5

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

$2x + y + \quad - 3u = 4$

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

$2x + y + z - 4u = 7$

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \overset{\text{III} \leftrightarrow \text{I}}{\sim} \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 2 & -5 & 1 & -3 \\ 0 & 3 & -4 & -5 & 0 \\ 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right]$$

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

✓

$$\left[\begin{array}{cccc|c} 1 & 0 & -3 & 3 & -9 \\ 0 & 1 & 0 & -3 & 4 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 4 \\ 0 & 0 & 1 & 0 & 3 \\ 0 & 0 & 0 & 1 & 0 \end{array}\right] \left[\begin{array}{c} x \\ y \\ z \\ u \end{array}\right]$$

✗

PROVJERA?

$x = 0$

$y = 4 + 3u$

$z = 3 + u$

$u = u = 3$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ ε5

IME I PREZIME: LUKA BUOŠIĆ **BROJ INDEKSA:** 17-2-0013-2010

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 3}$ 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) $\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right) =$ 7+2

   (b) $\lim_{n\to\infty}\left(\frac{x^2+5}{x^2}\right) =$ 4+2

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

(6)

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

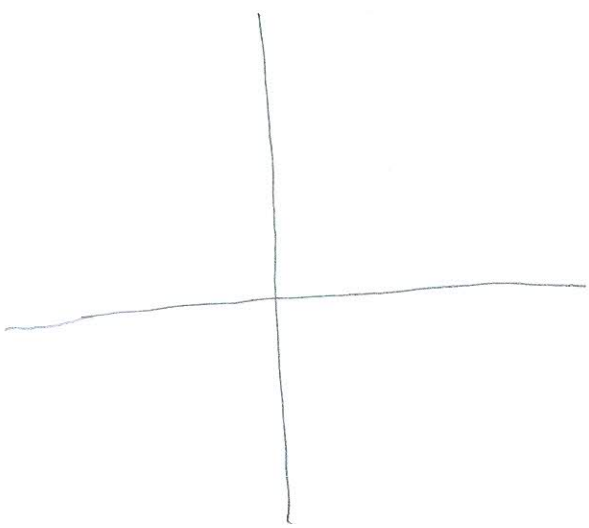
$$f'(x) = \frac{1}{\cos(2x^2-1)} \cdot (\cos(2x^2-1))'$$

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

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

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

(1) $z^3 - 5 + 3i = 0$



4

b) $\lim_{n\to\infty} \frac{x^2+5}{x^2} \begin{matrix} /:x^2 \\ /:x^2 \end{matrix} = \lim_{n\to\infty} \frac{1+\frac{5}{x^2}}{1} \begin{matrix} \to 0 \end{matrix} = \frac{1}{1} = 1$ ✓

a) $\lim_{x\to 0} \frac{\sqrt{3+x}-\sqrt{3}}{x} \begin{matrix} /:x^2 \\ /:x^2 \end{matrix} = \lim_{x\to 0} \frac{\sqrt{\frac{3}{x}+1}-\sqrt{\frac{3}{x}}}{\frac{1}{x}} \begin{matrix} \to \infty \end{matrix}$

$= \frac{0}{\infty}$ ✗

2

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

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

$\sqrt{x^2+3} = 0 \Rightarrow x = 0$

	$-\infty$		0		$\sqrt{3}$		∞
x		$-$		$+$		$-$	
$f'(x)$		$-$		$+$		$-$	
$f(x)$		↘		↗		↘	

globalni minimum je u točki $(0, \sqrt{3})$ ✓

glob max nema

(5)

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

$3r \leftrightarrows 1r$

$1r \cdot (-2) + 2r$
$1r \cdot (-4) + 3r$
$1 \cdot (-2) + 4r$

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

$1r \cdot 2 + 2r$
$1r \cdot 3 + 3r$
$1r \cdot 3 + 4r$

$1r + 2r$
$4r : (-3)$
$3r \cdot (-1)$

$4r \cdot 2 + 1r$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 12 \\ 0 & 1 & 0 & -3 & 4 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & -1 & 1 & 3 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & 12 \\ 0 & 1 & 0 & -3 & 4 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 0 & 6 \end{array}\right]$$

$3r + 4r$

sustav nema rješenja ✗

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

$3r \leftrightarrows 1r$

$1r \cdot (-2) + 2r$

$1r \cdot (-4) + 3r$

$4r = 1r$

$4r \leftrightarrows 1r$

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

$1r$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: DORA BUŽONJA **BROJ INDEKSA:** 0269081190

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2+3}$ 10

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4. Odrediti i uvrštavanjem (kalkulator) provjeriti rezultat

(a) $\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right) = \lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}/\cdot x}{x\ /\cdot x}\right) = \lim_{x\to 0}\left(\frac{\sqrt{\frac{3}{0}+\frac{x}{x^2}}-\frac{\sqrt{3}}{x}}{\frac{x}{x}}\right) = \frac{0}{1} = 0$ 7+2

(b) $\lim_{n\to\infty}\left(\frac{x^2+5}{x^2}\right) = \left\{\frac{\infty}{\infty} = \text{L'HOSPITAL}\right\} = \lim_{x\to\infty}\frac{(x^2)'+(5)'}{(x^2)'} = \lim_{x\to\infty}\frac{2x}{2x} = 0$ 4+2

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

$4\cdot(-\frac{2}{3}) - \frac{5}{6} + 2 + 2\cdot 0 = -1,5$

$2\cdot(-\frac{2}{3}) + \frac{5}{6} + 2 = \frac{3}{2}$

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

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

Ukupno: 20

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

1) MONOTONOST:

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

$f'(x) = 0$

$x = 0$

$f(0) = \sqrt{0^2+3} = \sqrt{3}$

$A(0, \sqrt{3})$ ✓

	$-\infty$		0		$+\infty$
$f'(x)$		$-$	0	$+$	
$f(x)$		↘	$\sqrt{3}$ min	↗	

$$f''(0) = \frac{3}{(0^2+3)\sqrt{0^2+3}} = \frac{3}{3\sqrt{3}} > 0$$

⇓

A min ✓

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

$$= \frac{\frac{2(x^2+3) - 2x^2}{2\sqrt{x^2+3}}}{(\sqrt{x^2+3})^2} = \frac{\frac{x^2+3-x^2}{\sqrt{x^2+3}}}{(\sqrt{x^2+3})^2} = \frac{3}{(\sqrt{x^2+3})\cdot(\sqrt{x^2+3})^2} = \frac{3}{\sqrt{x^2+3}\cdot(x^2+3)}$$

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

$f'' \neq 0 \Rightarrow 3 = 0 \Rightarrow$ nemoguće, nema točaka prevoja

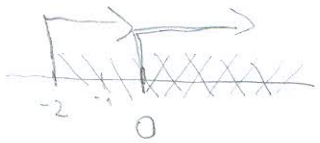
③ $h(x) = \sqrt{x^2+2x}$

1) DOMENA : $x^2+2x \geq 0$

$x(x+2) \geq 0$ $\quad D_f = [0, +\infty\rangle$

1. $x \geq 0$ $\quad x+2 \geq 0$

$x \geq -2$



2) NULTOČKE : $\sqrt{x^2+2x} = 0 \,/^2$ $\quad A(-1,0)$

$x^2+2x = 0$

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

$x_1 = x_2 = -1$

↳ nije u području definicije f-je

3) ASIMPTOTE :

a) V.A.

$$\lim_{x \to -1} \sqrt{x^2+2x} = \lim_{x \to -1} \sqrt{x^2+2x} \cdot \frac{\sqrt{x^2+2x}}{\sqrt{x^2+2x}} = \lim_{x \to -1} \frac{x^2+2x \,/\, x^2}{\sqrt{x^2+2x} \,/\, x^2} = \frac{1}{0} = +\infty$$

b) K.A. $\quad y = kx + l$

$$k = \lim_{x \to \pm\infty} \frac{f(x)}{x} = \lim_{x \to \pm\infty} \frac{\sqrt{x^2+2x}}{x} = \left\{ \frac{\infty}{\infty} = \text{L'HOSPITAL} \right\} = \lim_{x \to \pm\infty} \frac{(\sqrt{x^2+2x})'}{x'} = \lim_{x \to \pm\infty} \frac{\frac{1}{2\sqrt{x^2+2x}} \cdot (x^2+2x)'}{1} =$$

$$= \lim_{x \to \pm\infty} \frac{2x+2}{2\sqrt{x^2+2x}} = \lim_{x \to \pm\infty} \frac{2(x+1)}{2\sqrt{x^2+2x}} = \lim_{x \to \pm\infty} \frac{x+1 \,/\, x}{\sqrt{x^2+2x}} = \frac{1}{1} = 1$$

$$l = \lim_{x \to \pm\infty} (f(x) - kx) = \lim_{x \to \pm\infty} (\sqrt{x^2+2x} - x) = \left\{ \begin{matrix} \infty - \infty \\ \text{L'HOSPITAL} \end{matrix} \right\} = \lim_{x \to \pm\infty} \left[(\sqrt{x^2+x})' - x' \right] = \lim_{x \to \pm\infty} \left(\frac{1}{2\sqrt{x^2+x}} \cdot (x^2+x)' - 1 \right) =$$

$$= \lim_{x \to \pm\infty} \left(\frac{2x+2}{2\sqrt{x^2+x}} - x \right) = \lim_{x \to \pm\infty} \left(\frac{2(x+1)}{2\sqrt{x^2+x}} - \frac{x}{1} \right) = \lim_{x \to \pm\infty} \frac{x+1 - x \cdot \sqrt{x^2+x} \,/ x}{\sqrt{x^2+x} \,/ x} = \frac{1-1 \cdot \sqrt{1}}{\sqrt{1}} = \frac{1-1}{1} =$$

$= \frac{0}{1} = 0$ ✗ $\quad y = x$

x	0	1	2
y	0	1	2

B(0,0)
C(1,1)

→ nema H.A. jer imamo K.A.

(3.) 4) PARNOST I NEPARNOST

$f(-x) = \sqrt{(-x)^2 + 2\cdot(-x)} = \sqrt{x^2 - 2x} \Rightarrow$ f-ja nije ni parna ni neparna

5) MONOTONOST:

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

$\frac{-3}{0} = \frac{+}{0}$

0 u -1
: ONT

$f'(x) = 0 \quad T\left(-1, \sqrt{-1}\right)$

$x + 1 = 0$

$x = -1$

↳ nije u domeni f-je

$f(-1) = \sqrt{(-1)^2 + 2\cdot(-1)} = \sqrt{1-2} = \sqrt{-1}$

	$-\infty$		-1		$+\infty$
$f'(x)$		−	∄		
$f(x)$		↘	min.	↗	

6) EKSTREMI:

$$f''(x) = \frac{(x+1)'\cdot\left(\sqrt{x^2+2x}\right) - (x+1)\cdot\left(\sqrt{x^2+2x}\right)'}{\left(\sqrt{x^2+2x}\right)^2} = \frac{\sqrt{x^2+2x} - (x+1)\cdot\frac{1}{2\sqrt{x^2+2x}}\cdot\left(x^2+2x\right)'}{\left(\sqrt{x^2+2x}\right)^2} = \frac{\sqrt{x^2+2x} - \left[(x+1)\cdot\frac{1}{2\sqrt{x^2+2x}}\cdot(2x+2)\right]}{\left(\sqrt{x^2+2x}\right)^2} =$$

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

$$= \frac{\cancel{x^2+2x} - \cancel{x^2} - \cancel{2x} - 1}{\sqrt{x^2+2x}\left(\sqrt{x^2+2x}\right)^2} = \frac{-1}{\sqrt{x^2+2x}\left(\sqrt{x^2+2x}\right)^2}$$

$f''(x) = 0$

$-1 = 0$

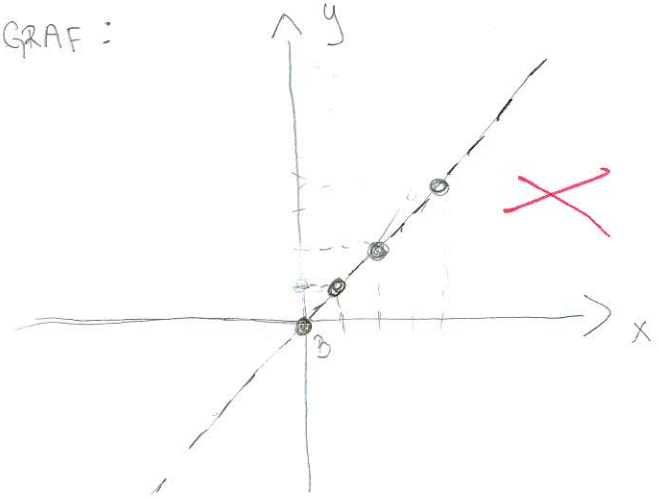
↳ nemoguće pa nemamo točke prijeloja

$$f''(-1) = \frac{-1}{\sqrt{1-2}\left(\sqrt{1-2}\right)^2} = \frac{-1}{\sqrt{-1}\cdot(-1)} = \frac{-1}{-\sqrt{-1}} = \frac{1}{\sqrt{-1}} =$$

⇒ nema

DORA BUŽONJA

7) GRAF:



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

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

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

5)

$$\left[\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & 3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] /:4 \sim \left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & -\frac{1}{4} \\ 2 & 1 & 0 & 3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] \begin{array}{l} /\cdot(-2) \\ /\cdot(-1) \\ + \\ + \\ + \end{array} \sim \left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & -\frac{1}{4} \\ 0 & \frac{3}{2} & -\frac{1}{2} & 2 & \frac{9}{2} \\ 0 & -\frac{3}{4} & \frac{2}{4} & \frac{1}{2} & \frac{9}{4} \\ 0 & \frac{3}{2} & \frac{1}{2} & -5 & \frac{15}{2} \end{array}\right] /:\frac{3}{2} \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & -\frac{1}{4} & \frac{1}{4} & \frac{1}{2} & -\frac{1}{4} \\ 0 & 1 & -\frac{1}{3} & \frac{4}{3} & 3 \\ 0 & -\frac{3}{4} & \frac{2}{4} & \frac{1}{2} & \frac{9}{4} \\ 0 & \frac{3}{2} & \frac{1}{2} & -5 & \frac{15}{2} \end{array}\right] \begin{array}{l} + \\ /\cdot(\frac{1}{4}) /\cdot(\frac{3}{4}) /\cdot(\frac{3}{2}) \\ + \\ + \end{array} \sim \left[\begin{array}{cccc|c} 1 & 0 & \frac{1}{6} & \frac{5}{6} & \frac{1}{2} \\ 0 & 1 & -\frac{1}{3} & \frac{4}{3} & 3 \\ 0 & 0 & \frac{3}{2} & \frac{3}{2} & \frac{9}{2} \\ 0 & 0 & 1 & -7 & 3 \end{array}\right] /:\frac{3}{2} \sim \left[\begin{array}{cccc|c} 1 & 0 & \frac{1}{6} & \frac{5}{6} & \frac{1}{2} \\ 0 & 1 & -\frac{1}{3} & \frac{4}{3} & 3 \\ 0 & 0 & 1 & 1 & 3 \\ 0 & 0 & 1 & -7 & 3 \end{array}\right] \begin{array}{l} \cdot(-\frac{1}{6}) \\ \cdot(\frac{1}{3}) \\ + \\ + \end{array}$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & \frac{2}{3} & 0 \\ 0 & 1 & 0 & \frac{5}{3} & \frac{5}{2} \\ 0 & 0 & 1 & 1 & 3 \\ 0 & 0 & 0 & -8 & 0 \end{array}\right] /:(-8) \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & \frac{2}{3} & 0 \\ 0 & 1 & 0 & \frac{5}{3} & \frac{5}{2} \\ 0 & 0 & 1 & 1 & 3 \\ 0 & 0 & 0 & 1 & 0 \end{array}\right]$$

$x + \frac{2}{3} = 0 \Rightarrow x = -\frac{2}{3}$

$y + \frac{5}{3} = \frac{5}{2} \Rightarrow y = \frac{5}{2} - \frac{5}{3} = \frac{5}{6}$

$z + 1 = 3 \Rightarrow z = 2$

$t = 0$

PROVJERA?

DORA BUŽONJA

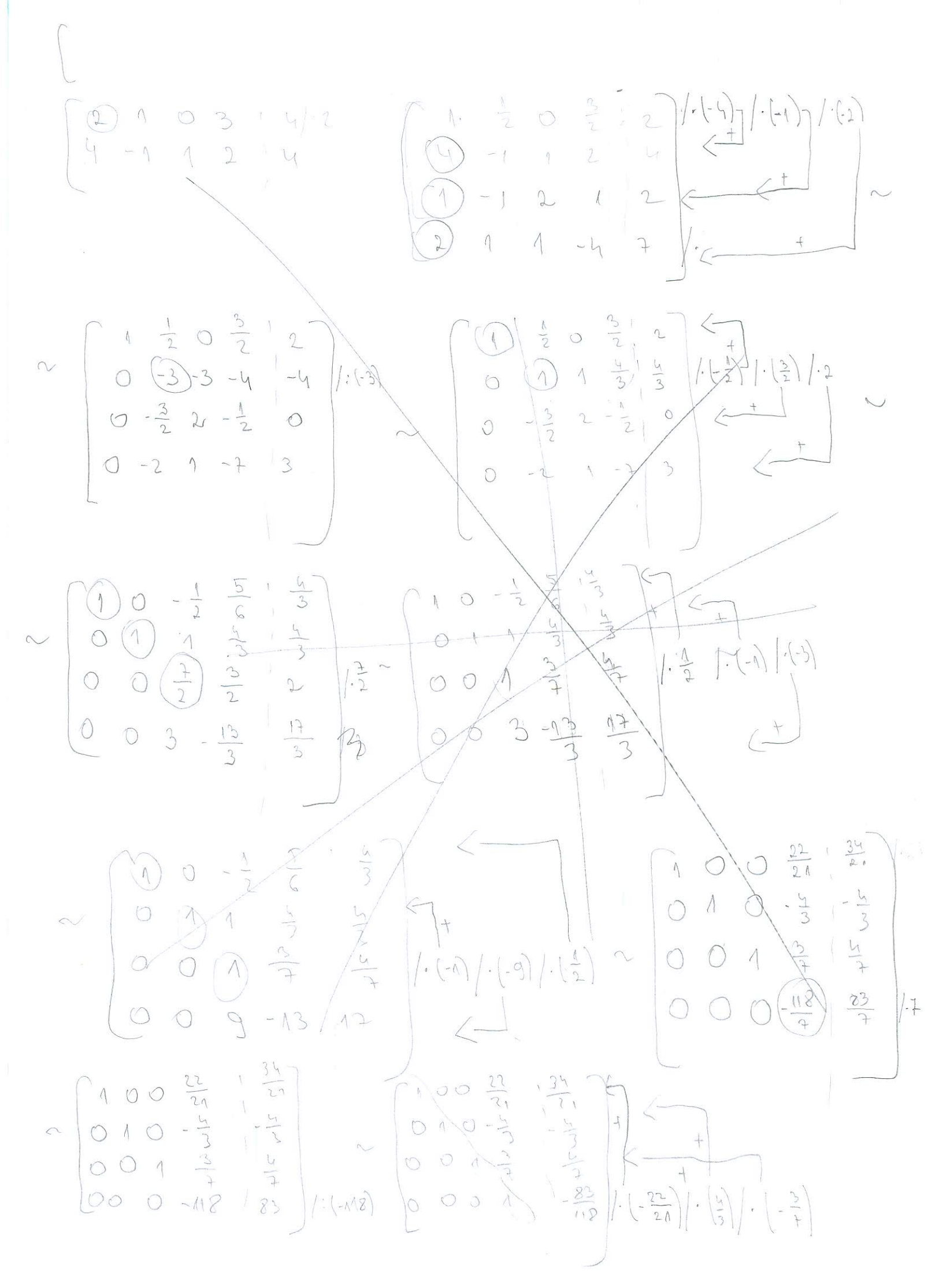
(1.) $z^3 - 5 + 3i = 0$

$z^3 = 5 - 3i \;/\sqrt[3]{}$

$z = \sqrt[3]{5-3i} \Rightarrow w = 5 - 3i \Rightarrow x = 5,\ y = -3$

$\sqrt[n]{z} = \sqrt[n]{\rho}\left(\cos\frac{\varphi_1 + 2k\pi}{n} + i\sin\frac{\varphi_2 + 2k\pi}{n}\right)$

$\rho = \sqrt{x^2+y^2} = \sqrt{5^2+(-3)^2} = \sqrt{25+9} = \sqrt{34}$



MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod↓↓ €5

IME I PREZIME: Antonio Jović

BROJ INDEKSA: 17-2-0278-2013 02690760958

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 3}$ 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) $\lim_{x \to 0} \left(\frac{\sqrt{3+x} - \sqrt{3}}{x} \right) =$ 7+2

   (b) $\lim_{n \to \infty} \left(\frac{x^2 + 5}{x^2} \right) =$ 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: 20

5.

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

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

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

$$\sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & -1 & 1 & 2 & -1 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & -1 & 1 & 2 & -1 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right] \begin{matrix} \\ :-(-1) \\ \\ \\ \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right] \begin{matrix} \\ +2 \\ \\ \\ \end{matrix} \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right] \begin{matrix} \\ \\ (-3)+\text{II} \\ \\ \end{matrix} \sim \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 0 & -4 & 4 & -12 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right] \begin{matrix} \\ \\ \\ :(-4) \end{matrix} \left[\begin{array}{cccc|c} 1 & 0 & 1 & -1 & 3 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right]$$

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

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

$x = 0$ $\quad y = 4$ $\quad z + u = -3$

$y - 3u = 4$

$z - u = 3$ $\quad -z + u = -3$

BESKONAČNO RJEŠENJA

PROVJERA ?

Antonio Jović

5.

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

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

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

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & -3 & -1 & 10 & -15 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right] +II \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & -3 & -1 & 10 & -15 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & -3 & -1 & 10 & -15 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \cdot(-1) \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & 1 & -10 & 15 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] +I \sim \left[\begin{array}{cccc|c} 1 & 0 & 3 & 9 & 17 \\ 0 & 1 & 1 & -10 & 15 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \cdot(-3)+IV \sim$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 3 & 9 & 17 \\ 0 & 1 & 1 & -10 & 15 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 0 & -6 & 24 & -42 \end{array}\right] \cdot(-1) \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 3 & 9 & 17 \\ 0 & 1 & 1 & -10 & 15 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & -6 & 24 & -42 \end{array}\right] \cdot(6) \sim \left[\begin{array}{cccc|c} 1 & 0 & 3 & 9 & 17 \\ 0 & 1 & 1 & -10 & 15 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 1 & -4 & 7 \end{array}\right] \cdot(-3)+I \cdot(-1)+II \sim$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 12 & 8 \\ 0 & 1 & 0 & -6 & 8 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 1 & -4 & 7 \end{array}\right] \cdot(-1)+IV \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 12 & 8 \\ 0 & 1 & 0 & -6 & 8 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & -3 & 4 \end{array}\right] \cdot(-3) \sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 12 & 8 \\ 0 & 1 & 0 & -6 & 8 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 1 & -\frac{3}{4} \end{array}\right] \cdot(2)+I \cdot(6)+II \sim$$

$$\left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & \frac{21}{4} \\ 0 & 1 & 0 & 0 & \frac{7}{2} \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & 0 & 1 & -\frac{3}{4} \end{array}\right] +III \sim$$

$$\sim \left[\begin{array}{cccc|c} 1 & 0 & 0 & 0 & \frac{21}{4} \\ 0 & 1 & 0 & 0 & \frac{7}{2} \\ 0 & 0 & 1 & 0 & \frac{9}{4} \\ 0 & 0 & 0 & 1 & -\frac{3}{4} \end{array}\right]$$

Antonio Jović

$$\begin{bmatrix} x = \frac{21}{4} \\ y = \frac{7}{2} \\ z = \frac{9}{4} \\ u = -\frac{3}{4} \end{bmatrix}$$

$$\frac{4 \cdot 21}{4} - \frac{7}{2} + \frac{9}{4} + 2 \cdot \left(-\frac{3}{4}\right) = -1$$

$$2 \cdot \left(-\frac{21}{4}\right) + \frac{7}{2} - 3\left(-\frac{3}{4}\right) = 4$$

5.25

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

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

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

(4.) a) $\lim_{x \to 0} \left(\frac{\sqrt{3+x} - \sqrt{3}}{x} \right)$

$$\lim_{x \to 0^+} \left(\frac{\sqrt{3+0^+} - \sqrt{3}}{0^+} \right) = +\infty \quad //$$

$$\lim_{x \to 0^-} \left(\frac{\sqrt{3+0^-} - \sqrt{3}}{0^-} \right) = +\infty \quad // \quad \times$$

b) $\lim_{x \to \infty} \left(\frac{x^2+5}{x^2} \right)^4 = \lim_{x \to \infty} \frac{x^2+5 \,/ x^2}{x^2 / x^2} = \frac{1+5}{1} = 6 \quad \times$

$\lim_{x \to +\infty} \left(\frac{x^2+5}{x^2} \right)^{\infty} = \infty$

$\lim_{x \to -\infty}$

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

$x^2+3 \geq 0$

$x^2 \geq -3$

$D_f \in \mathbb{R}$ //

$(\sqrt{x})' = \frac{1}{2\sqrt{x}}$

$g'(x) = \frac{b' \cdot n - b \cdot n'}{n^2}$

$g'(x) = \frac{\frac{1}{2\sqrt{x^2+3}} \cdot 1 - \sqrt{x^2+3} \cdot 0}{1}$

$g'(x) = \frac{1}{2\sqrt{x^2+3}}$ //

$2\sqrt{x^2+3} > 0$

$x^2+3 \geq 0$

$2\sqrt{x^2+3} = 0 \quad /^2$

$4(x^2+3) = 0$

$4x^2 + 12 = 0$

$4x^2 = 12$

$x^2 = 3$

$x = \pm\sqrt{3}$

$x_1 = \sqrt{3}$

$x_2 = -\sqrt{3}$

$y_1 = \frac{1}{2\sqrt{(\sqrt{3})^2+3}} = \frac{1}{2\sqrt{6}}$

$y_2 = \frac{1}{2\sqrt{(-\sqrt{3})^2+3}} = \frac{1}{2\sqrt{6}}$

$T_1\left(\sqrt{3}, \frac{1}{2\sqrt{6}}\right)$

$T_2\left(-\sqrt{3}, \frac{1}{2\sqrt{6}}\right)$ //

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

$x^2 + 2x \geq 0$

$x(x+2) \geq 0$

① $D_f = \langle -\infty, -2] \cup [0, +\infty\rangle$ kandidate za vertikalne asim. nema!

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

HORIZONTALNIH NEMA!

$$\lim_{x\to+\infty} \frac{\sqrt{x^2-2x}}{x} = \lim_{x\to+\infty} \sqrt{1+\frac{2}{x}} = \sqrt{1+0} = 1,$$

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

$\boxed{y = x+1}$ je kosa asimptota!! ✓

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

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

$\boxed{y = x-1}$ je kosa asimptota!! ✓

Antonio Jović

1.

$z^3 - 5 + 3i = 0$

$z^3 = 5 - 3i$

$5 - 3i = w$

$w = z^3$

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

$r = \sqrt{5^2 + 3^2}$

$r = \sqrt{34}$

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

$tg\varphi = -\frac{3}{5}$

$\varphi = arctg\left(-\frac{3}{5}\right)$

$k_1 = 0$

$k_2 = 1$

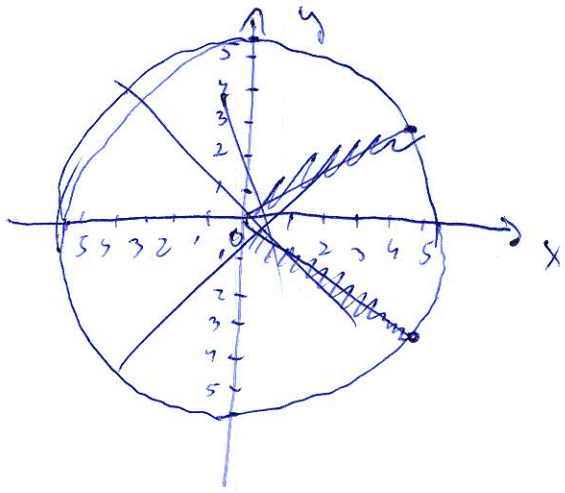
$k_3 = 2$

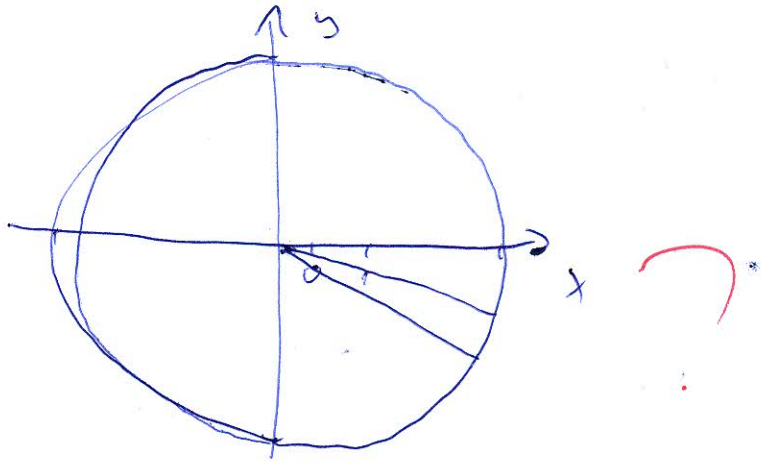
$w = \sqrt[3]{34}\left(\cos\left(arctg\left(-\frac{3}{5}\right)\right) + i\sin\left(arctg\left(-\frac{3}{5}\right)\right)\right)$

$\alpha_1 = \sqrt[3]{34}\left(\cos\left(\frac{arctg\left(-\frac{3}{5}\right)}{3}\right) + i\sin\left(\frac{arctg\left(-\frac{3}{5}\right)}{3}\right)\right)$

$\alpha_2 = \sqrt[3]{34}\left(\cos\left(\frac{\left(arctg\left(-\frac{3}{5}\right)\right)+2\pi}{3}\right) + i\sin\left(\frac{\left(arctg\left(-\frac{3}{5}\right)\right)+2\pi}{3}\right)\right)$

$\alpha_3 = \sqrt[3]{34}\left(\cos\left(\frac{arctg\left(-\frac{3}{5}\right)+4\pi}{3}\right) + i\sin\left(\frac{arctg\left(-\frac{3}{5}\right)+4\pi}{3}\right)\right)$





5. NASTAVAK

Antonio Jović

$(\sqrt{x})' = \frac{1}{2\sqrt{x}}$

3° $x(x+2) = 0$

$x_1 = 0$

$x_2 = -2$

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

$h'(x) = \frac{\frac{1}{2\sqrt{x^2+2x}} \cdot \not{4} - 0}{1} = \frac{1}{2\sqrt{x^2+2x}}$

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

$4(x^2+2x) = 0$

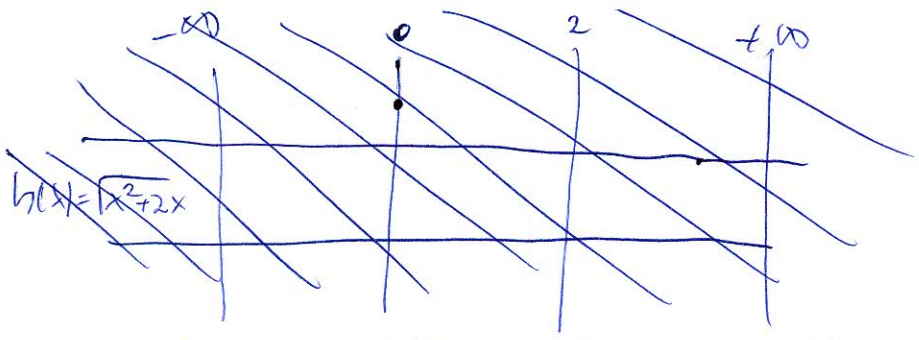
$4x^2 + 8x = 0$

$4x(x+2) = 0$

$x_1 = -2$

$x_2 = 0$

$y_1 = \frac{1}{2\sqrt{4-4}} = \frac{1}{0} = \not\exists$ nema ekstrema!

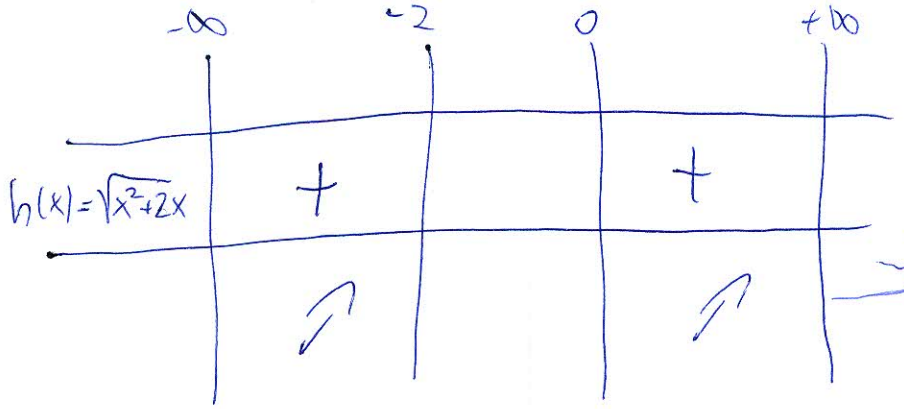


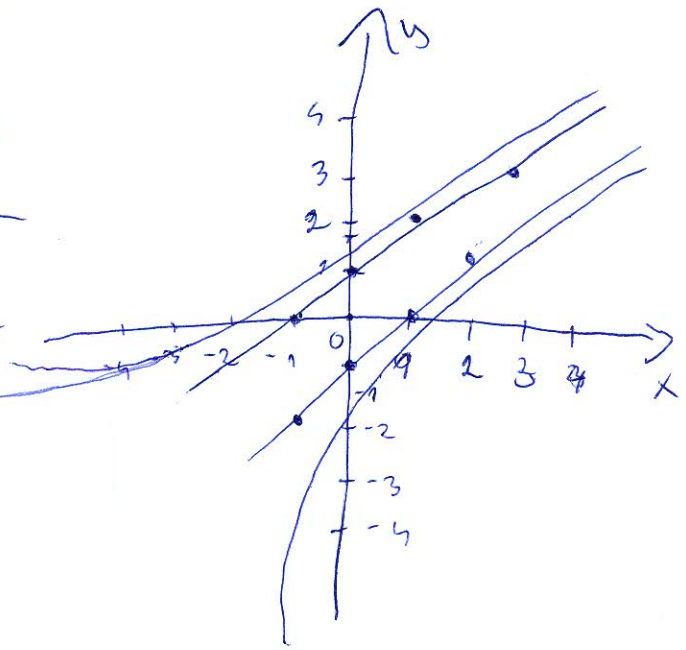
1°

x	-1	0	1	2
y	0	1	2	3

2°

x	-2	-1	0	1
y	-2	-1	0	1





MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇓⇓ $\mathcal{E}5$

IME I PREZIME: ANDRIJA PAVIN **BROJ INDEKSA:** 17-2-0128-2011

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3

2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 3}$ 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) $\lim_{x \to 0} \left(\frac{\sqrt{3+x} - \sqrt{3}}{x} \right) =$ 7+2

   (b) $\lim_{n \to \infty} \left(\frac{x^2 + 5}{x^2} \right) =$ 4+2

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: 20

ANDRIJA PAVIN

1) $z^3 - 5 + 3i = 0$

$z^3 = 5 - 3i \qquad x = 5 \qquad y = -3$

$z = \sqrt[3]{5 - 3i}$

$|z| = \sqrt{x^2 + y^2} \qquad \varphi = \arctan \frac{y}{x}$

$|z| = \sqrt{5^2 + (-3)^2} \qquad \varphi = \arctan \frac{-3}{5}$

$|z| = \sqrt{25 + 9}$

$|z| = \sqrt{34} \qquad \varphi = -0.54$

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

$k = 0, 1, 2$

$k = 0, \quad z_1 = \sqrt[3]{34} \cdot \left(\cos \frac{-0.54 + 2 \cdot 0 \cdot \pi}{3} + i \sin \frac{-0.54 + 2 \cdot 0 \cdot \pi}{3} \right)$

$z_1 = \sqrt[3]{34} \cdot (0.98 - 0.18i)$

$z_1 = 3.17 - 0.58i$

$k = 1, \quad z_2 = \sqrt[3]{34} \cdot \left(\cos \frac{-0.54 + 2 \cdot 1 \cdot \pi}{3} + i \cdot \sin \frac{-0.54 + 2 \cdot 1 \cdot \pi}{3} \right)$

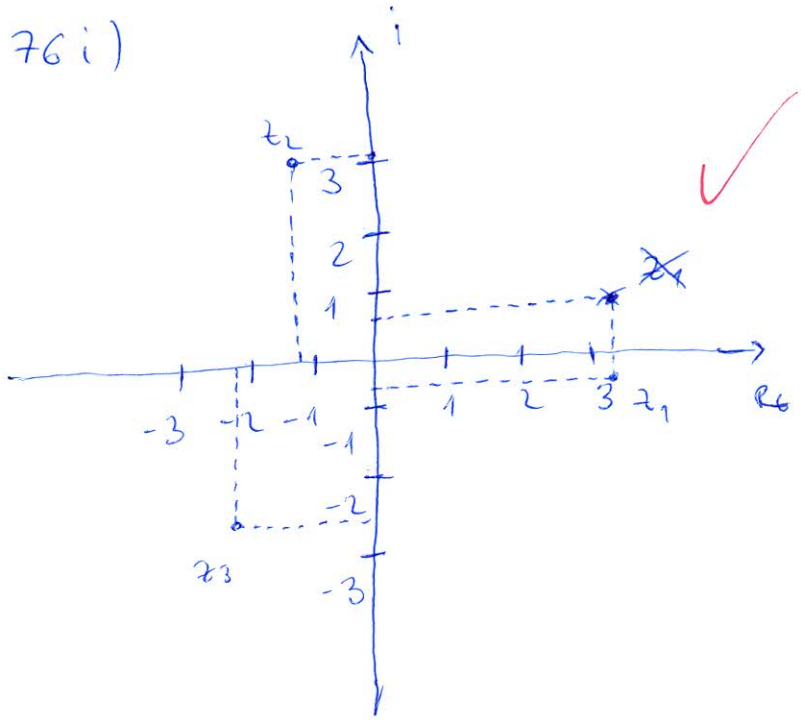
$z_2 = \sqrt[3]{34} \cdot (-0.34 + 0.94i)$

$z_2 = -1.10 + 3.05i$

$k = 2, \quad z_3 = \sqrt[3]{34} \cdot \left(\cos \frac{-0.54 + 2 \cdot 2 \cdot \pi}{3} + i \cdot \sin \frac{-0.54 + 2 \cdot 2 \cdot \pi}{3} \right)$

$z_3 = \sqrt[3]{34} \cdot (-0.65 - 0.76i)$

$z_3 = -2.11 - 2.46i$



5) $4x - y + z + 2u = -1$

$2x + y - 3u = 4$

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$2x + y + z - 4u = 7$

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

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 3 & -4 & -5 & 0 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right] \begin{array}{l} /\cdot(-1) \\ II + III \\ II + IV \end{array} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 0 & 3 & -3 & 9 \\ 0 & 0 & 4 & -4 & 12 \end{array}\right] \begin{array}{l} \\ \\ /\cdot 4 \\ /\cdot(-3) \end{array} \sim$$

VIŠE RJEŠENJA...

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 0 & 12 & -12 & 36 \\ 0 & 0 & -12 & 12 & -36 \end{array}\right] \begin{array}{l} \\ \\ \\ III + IV \end{array} \sim \left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -7 & -2 & -9 \\ 0 & 0 & 12 & -12 & 36 \\ 0 & 0 & 0 & 0 & 0 \end{array}\right]$$

$u = 0$

$12z = 36 \;/:12$

$z = 3$

PROVJERA

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

$-4 + 3 = -1 \quad \boxed{-1 = -1}$

2) $2 \cdot 0 + 4 - 3 \cdot 0 = 4 \quad \boxed{4 = 4}$

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

$-4 + 6 = 2 \quad \boxed{2 = 2}$

4) $2 \cdot 0 + 4 + 3 - 4 \cdot 0 = 7 \quad \boxed{7 = 7}$

$3y - 7 \cdot 3 = -9$

$3y = 12 \;/:3$

$\boxed{y = 4}$

$x + (-1 \cdot 4) + 2 \cdot 3 = 2$

$x - 4 + 6 = 2$

$\boxed{x = 0}$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: KREŠIMIR PIPLICA

BROJ INDEKSA: 0269048329

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *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: 15

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

$\cdot(-2)$ $\cdot(-4)$ $\cdot(-2)$

$$\sim \begin{bmatrix} 1 & -1 & 2 & 1 & | & 2 \\ 0 & 3 & -4 & -5 & | & 0 \\ 0 & 3 & -7 & -2 & | & -9 \\ 0 & 3 & -3 & -6 & | & 3 \end{bmatrix}$$

KREŠIMIR PIPLICA

(3) H.A.

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

$h(x)=\sqrt{\frac{x^2}{x^2}+\frac{2x}{x^2}}=\sqrt{1}=1$ H.A. $g=1$

K.A. nema jer imamo H.A.

(5) deriviramo

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

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

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

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

b) $h(0)=\frac{2x}{\sqrt{x^2+2x}}=0 \quad /\sqrt{x^2+2x}$

$2x=0 \quad /:2$

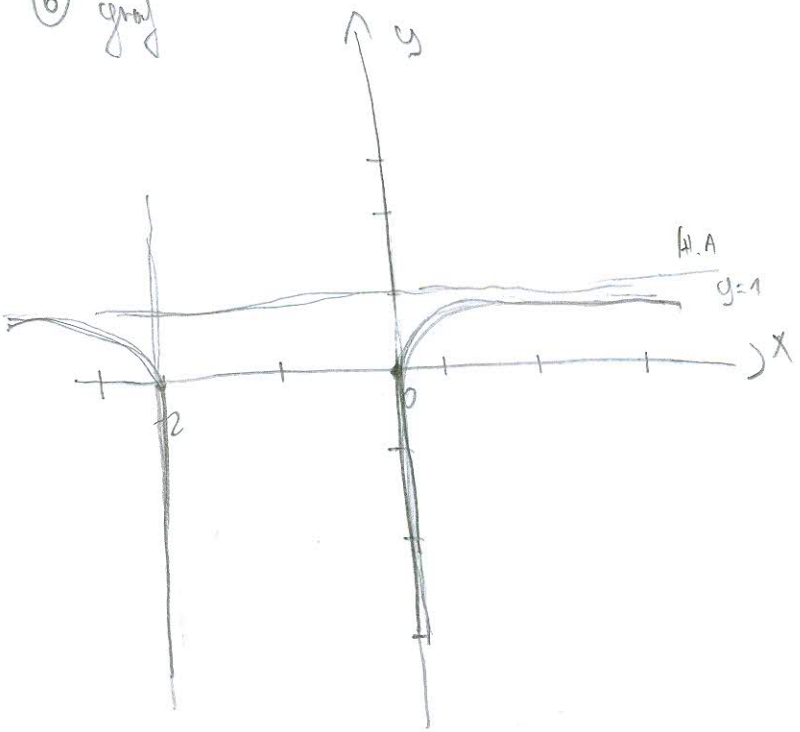
$x=0 \rightarrow$ stacionarna točka

	$-\infty$		0		$+\infty$
$f'(x)$		−		+	
$f(x)$		↘		↗	

ODGOVOR NA PITANJE U ZADATKU JEST?

5

⑥ graf



④

a) $\lim_{x \to 0} \left(\frac{\sqrt{3+x} - \sqrt{3}}{x} \right) = \frac{+\text{brog}}{0} = \pm\infty$

b) $\lim_{n \to \infty} \left(\frac{x^2+5}{x^2} \right) =$

⑥ $f(x) = \ln(\cos(2x^2-1))$

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

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

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

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

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

KREŠIMIR PUPLICA

⑤ $4x - y + z + 2u = -1$

$2x + y - 3u = 4$

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

$2x + y + z - 4u = 7$

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

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

(2)

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

Domena

$\sqrt{x^2+3} \geq 0 \quad |^2$

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

$x^2+3 \geq 0$

$x^2 \geq -3 \quad |^{\sqrt{}}$

$x \geq \sqrt{-3}$

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

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

$g(0) = \frac{2x}{\sqrt{x^2+3}} = 0 \quad | \cdot \sqrt{x^2+3}$

$2x = 0 \quad |:2$

$x = 0$ ✓

	$-\infty$		0		$+\infty$
$f'(x)$		$-$		$+$	
$f(x)$		↓		↑	

⑤

$$\begin{bmatrix} 4x - y + z + 2u = -1 \\ 2x - y \quad\quad - 3u = 4 \\ x - y + 2z + u = 2 \\ 2x + y - z - 4u = 1 \end{bmatrix}$$

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

$$\sim \begin{bmatrix} 1 & -1 & 2 & 1 & | & 2 \\ 0 & 1 & -4 & -5 & | & 0 \\ 0 & 3 & -6 & -2 & | & -9 \\ 0 & 3 & -3 & -6 & | & -3 \end{bmatrix} \begin{matrix} \\ \cdot(-3) \\ \cdot(-3) \\ \\ \end{matrix} \sim \begin{bmatrix} 1 & -1 & 2 & 1 & | & 2 \\ 0 & 1 & -4 & -5 & | & 0 \\ 0 & 0 & 6 & 13 & | & -9 \\ 0 & 0 & 9 & 9 & | & 3 \end{bmatrix}$$

KREŠIMIR PIPLICA

③ $h(x) = \sqrt{x^2+2x}$

① Domena

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

$x^2+2x \geq 0$

$a = 1$
$b = 2$
$c = 0$

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

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

$= \frac{-2 \pm 2}{2}$

$x_1 = \frac{0}{2} = 0$

$x_2 = -2$

$D_f = \langle -\infty, -2] \cup [0, +\infty \rangle$

② Nultočke

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

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

$x = \frac{-2 \pm 2}{2}$

$x_1 = 0$

$x_2 = -2$

$g_0 = \sqrt{0^2+2 \cdot 0} = 0$

$(0,0)$

$(-2,0)$

GRAF NIJE DOBAR

③ parna ili neparna

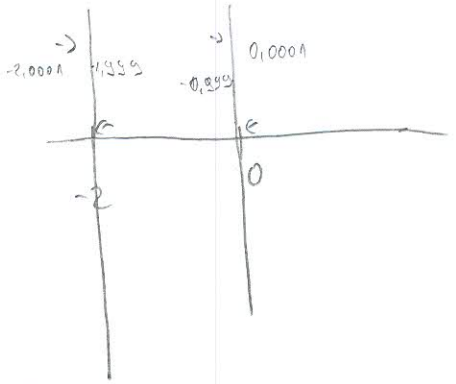
$$h(x) = \sqrt{x^2+2x}$$

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

Funkcija nije ni parna ni neparna

④ Asimptote

V.A.



$$\lim_{x\to -2^+} \frac{+\text{broj}}{+0} = +\infty$$

$$\lim_{x\to -2^-} \frac{+\text{broj}}{+0} = +\infty$$

V.A. = -2

$$\lim_{x\to 0^-} \frac{+\text{broj}}{0} = +\infty$$

$$\lim_{x\to 0^+} \frac{+\text{broj}}{0} = +\infty$$

V.A. = 0

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: DRAGAN ASIĆ **BROJ INDEKSA:** 17-2-0276-2013

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2+3}$ 10
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Ukupno: 10

(5) $4x - y + z + 2u = -1$

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

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

$$\left[\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -\frac{4}{3} & -\frac{5}{3} & 0 \\ 0 & 0 & 2 & 4 & -12 \\ 0 & 0 & -2 & -4 & 12 \end{array}\right] \begin{array}{l} \\ \cdot\frac{1}{3} \\ \\ \end{array}$$

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

NEMA RJEŠENJA ✗

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

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

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

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

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

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

DOMENA

$D(h) = \mathbb{R} \setminus [-2, 0]$

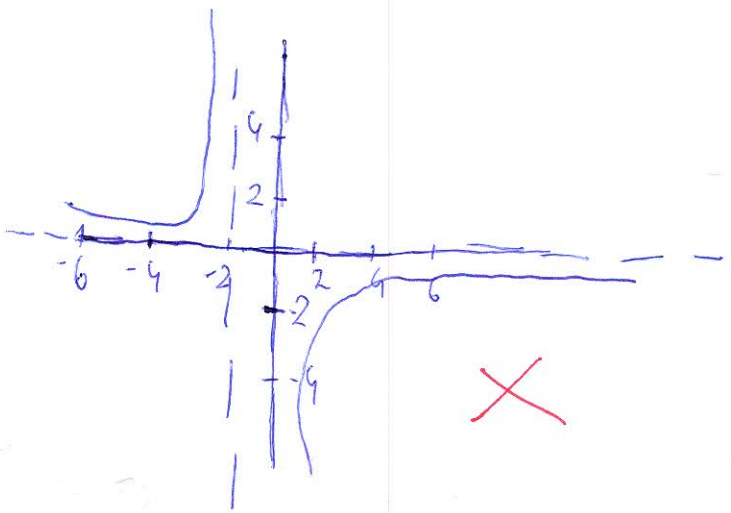
$1^\circ\ x^2+2x > 0$

$x \cdot (x+2) > 0$

$x \cdot (x+2) = 0$

$x_1 = 0 \quad x_2 + 2 = 0$

$x_2 = x = -2$



✗

ASIMPTOTE

NULTOČKE NEMA

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

$\lim_{x \to 0^-} \sqrt{x^2+2x} = \frac{0}{-0}$ $x = 0$ V.A

$\lim_{x \to -2^-} \sqrt{x^2+2x} = -\infty$ $x = -2$ ~~V.A~~ ~~2. ASIMPTOTA~~ Vertikalna asimptota

H. ASIMPTOTE

$\lim_{x \to -\infty} \sqrt{x^2+2x} = -\infty$ $y = 0$ H.A

DRAGAN ASIĆ

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

$h(x) =$

PARNOST NEPARNOST

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

$h(-x) = \sqrt{x^2 - 2x}$ FUNKCIJA JE PARNA

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

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

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

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

$g(x) = (x^2+3)^{\frac{2}{2}}$

$g'(x) = x^2+3$

$E_1 = x^2+3=0$

$x^2 = -3$

$x = \sqrt{-3}$

$E_1 = [\sqrt{3}, 2.5]$

$E_2 = [\sqrt{-3}, 1.1]$

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IME I PREZIME: GORAN BASIOLI **BROJ INDEKSA:** 17-1-0031-2010

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *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: 10

4) $\lim_{x \to \infty} \left(\frac{x^2+5}{x^2} \right)_{/:x^2}^{/:x^2} = \frac{5}{1} = 5$ ✗

$\lim_{x \to 0} \left(\frac{\sqrt{3+x} - \sqrt{3}}{x} \right) = \frac{0}{0} = \not{\phi} = \lim_{x \to 0} \frac{\frac{1}{\sqrt{x+3}}}{1} = \frac{1}{\sqrt{x+3}}$ ✗

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

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

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

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

$$g'(x) = \frac{1}{2\sqrt{x^2+3}} + 2x = \frac{x}{\sqrt{x+2}}$$

$$g'(x) = \frac{x}{\sqrt{x+2}} = 0 \Rightarrow x = 0$$

$$g(0) = \sqrt{0+3} = \sqrt{3}$$

$$\lim_{x \to 0} g(x) = \lim_{x \to \infty} \sqrt{x^2+3} = \infty$$

$$\lim_{x \to \infty} g(x) = \lim_{x \to \infty} \sqrt{x^2+3} = \infty$$

GORAN BASIOLI

1) $z^3 - 5 + 3i = 0$

$z^3 = 5 - 3i$

$|z| = \sqrt{5^2 + (-3)^2} = \sqrt{25+9} = \sqrt{34}$

$tg\varphi = \frac{y}{x} = \frac{-3}{5} = -0,6 \Rightarrow \varphi \approx 330°$

$z = |z| \cdot (\cos\varphi + i \sin\varphi)$

$k = 0$

$w_1 = \sqrt[3]{|z|} \cdot \left(\frac{\cos\varphi + 2\pi \cdot k}{3} + i \frac{\sin\varphi + 2\pi \cdot k}{3} \right) = \sqrt[6]{34} \cdot \left(\frac{\cos 330 + 2\pi \cdot 0}{3} + i \frac{\sin 330 + 2\pi \cdot 0}{3} \right)$

$w_1 = 1,8 \cdot \left(\frac{\cos 330°}{3} + i \frac{\sin 330°}{3} \right) = 1,8 \cdot (0,29 - 0,16i)$

ISTO?

$k = 1$

$w_2 = \sqrt[3]{|z|} \cdot \left(\frac{\cos\varphi + 2\pi \cdot k}{3} + i \frac{\sin\varphi + 2\pi \cdot k}{3} \right) = \sqrt[6]{34} \cdot \left(\frac{\cos 330° + 360° \cdot 1}{3} + i \frac{\sin 330° + 360 \cdot 1}{3} \right)$

$= 1,8 \cdot (0,29 - 0,16i)$

$k = 2$

$w_2 = \sqrt[3]{|z|} \cdot \left(\frac{\cos\varphi + 2\pi \cdot k}{3} + i \frac{\sin\varphi + 2\pi \cdot k}{3} \right) = \sqrt[6]{34} \cdot \left(\frac{\cos 330° + 360° \cdot 2}{3} + i \frac{\sin 330° + 360 \cdot 2}{3} \right)$

$1,8 \cdot (0,98 - 0,17i)$

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ $\mathcal{E}5$

IME I PREZIME: HRVOJE DIJAN **BROJ INDEKSA:**

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2+3}$ 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) $\lim_{x\to 0}\left(\frac{\sqrt{3+x}-\sqrt{3}}{x}\right) =$ 7+2

   (b) $\lim_{n\to\infty}\left(\frac{x^2+5}{x^2}\right) =$ 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: 0

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

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

5. a)

$$\left|\begin{array}{cccc|c} 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 0 & -3 & 4 \\ 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right| \curvearrowleft 2 \sim \left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 2 & 1 & 0 & -3 & 4 \\ 4 & -1 & 1 & 2 & -1 \\ 2 & 1 & 1 & -4 & 7 \end{array}\right| \begin{array}{l} -2\cdot \text{I} \\ -4\cdot \text{I} \\ -2\cdot \text{I} \end{array} \sim$$

$$\left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -4 & -5 & 0 \\ 0 & 3 & -7 & -2 & -3 \\ 0 & 3 & -3 & -6 & 3 \end{array}\right| \begin{array}{l} \\ \\ \\ :3 \end{array} \sim \left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 3 & -4 & -5 & 0 \\ 0 & 3 & -7 & -2 & -3 \\ 0 & 1 & -1 & -2 & 1 \end{array}\right| \curvearrowleft 2 \sim \left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 3 & -7 & -2 & -3 \\ 0 & 3 & -4 & -5 & 0 \end{array}\right| \begin{array}{l} \\ -3\cdot \text{II} \\ -3\cdot \text{II} \end{array}$$

$$\left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 0 & -4 & 4 & -12 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right| \begin{array}{l} \\ \\ :4 \\ \\ \end{array} \sim \left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 0 & -1 & 1 & -3 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right| \begin{array}{l} \\ \\ \cdot(-1) \\ \\ \end{array} \sim \left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 0 & 1 & -1 & 3 \\ 0 & 0 & -1 & 1 & -3 \end{array}\right| \begin{array}{l} \\ \\ \\ -\text{III} \end{array}$$

$$\left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 0 & 1 & -1 & -3 \\ 0 & 0 & 0 & 2 & -6 \end{array}\right| \sim \left|\begin{array}{cccc|c} 1 & -1 & 2 & 1 & 2 \\ 0 & 1 & -1 & -2 & 1 \\ 0 & 0 & 1 & -1 & -3 \\ 0 & 0 & 0 & 1 & -3 \end{array}\right| \quad |:2$$

$v = -3$ //

$z - v = -3$

$z - (-3) = -3$

$z = -6$ //

$y - 2 - 2v = 1$

$y - (-6) - 2(-3) = 1$

$y + 6 + 6 = 1$

$y = -11$

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

$x - (-11) + 2 \cdot (-6) + (-3) = 2$

$x + 11 - 12 - 3 = 2$

$x - 4 = 2$

$x = 6$

$v = -3$

$z = -6$

$y = -11$

$x = 6$

$R = \begin{vmatrix} 6 \\ -11 \\ -6 \\ -3 \end{vmatrix}$ ✗

$2x + y + 2z + 4v = 7$

$12 - 11 - 6 + 12$

$7 = 7$

4. a) $\lim\limits_{x \to 0} \left(\dfrac{\sqrt{3-x} - \sqrt{3}}{x} \right) = \left[\dfrac{0}{0} \right] \overset{\text{l'H.}}{=} \lim\limits_{x \to 0} \dfrac{\frac{1}{2}(3-x)}{} = \lim\limits_{x \to 0} \dfrac{3}{2} - \dfrac{1}{2}x = \dfrac{3}{2}$ ✗

$g(x) = \sqrt{3-x}$

$g'(x) = (3-x)^{\frac{1}{2}}$

$g'(x) = \dfrac{1}{2}(3-x) \cdot 1$

✗

MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇓ $\mathcal{E}5$

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

POPUNJAVA NASTAVNIK
Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^3 - 5 + 3i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 12+3
2. Koji su globalni ekstremi funkcije $g(x) = \sqrt{x^2 + 3}$ 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

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

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

Ukupno: 0

1) Riješi jednadžbu među kompleksnim brojevima. Prikaži rješenja u kompleksnoj ravnini.

$z^3 - 5 + 3i = 0$

$z^3 = 5 - 3i \,/\sqrt[3]{}$

$z = \sqrt[3]{5-3i}$ // ALGEBARSKI ZAPIS

$\begin{bmatrix} x = 5 \\ y = -3 \end{bmatrix}$

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

$r = \sqrt{(5)^2 + (-3)^2}$

$r = \sqrt{25 + 9}$

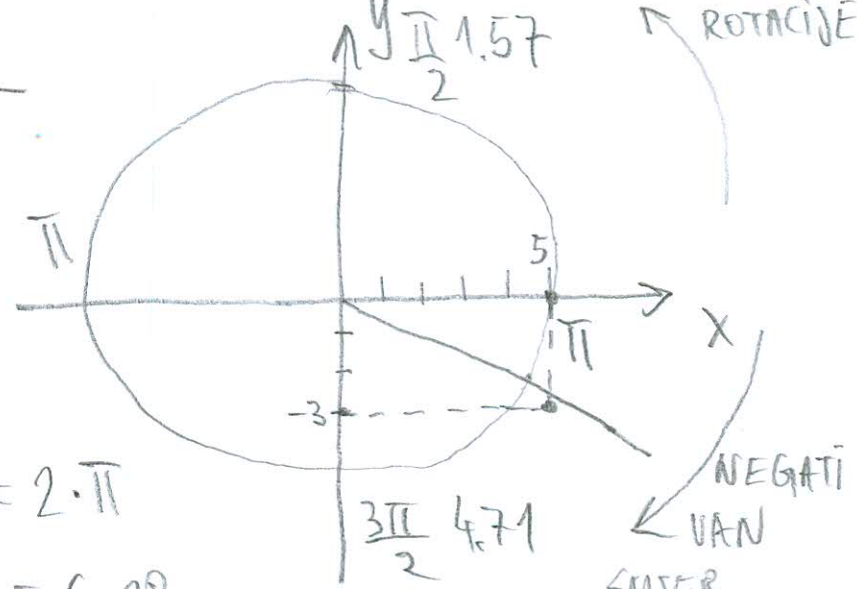
$r = \sqrt{34}$

$r = 5.83$ //

$\varphi = \operatorname{arc\,tng}\left(\frac{y}{x}\right)$ KUT NEMORE BITI NEGATIVAN

$\varphi = \operatorname{arc\,tng}\left(\frac{-3}{5}\right)$

$\varphi = -0.54 = \varphi_{PRAVI} = 6.28$



$\varphi_{PRAVI} = 2 \cdot \Pi$

$\varphi_{PRAVI} = 6.28$

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

$$z_0 = \sqrt[3]{5.83} \cdot \left[\cos\left(\frac{2 \cdot 0 \cdot \pi}{3}\right) + i \cdot \sin\left(\frac{2 \cdot 0 \cdot \pi}{3}\right) \right]$$

$$z_0 = \sqrt[3]{5.83} \cdot \left[1 + i \cdot 0 \right]$$

$$\boxed{z_0 = 1.78 + 0i}$$

$$z_1 = \sqrt[3]{5.83} \left[\cos\left(\frac{2 \cdot 1 \cdot \pi}{3}\right) + i \cdot \sin\left(\frac{2 \cdot 1 \cdot \pi}{3}\right) \right]$$

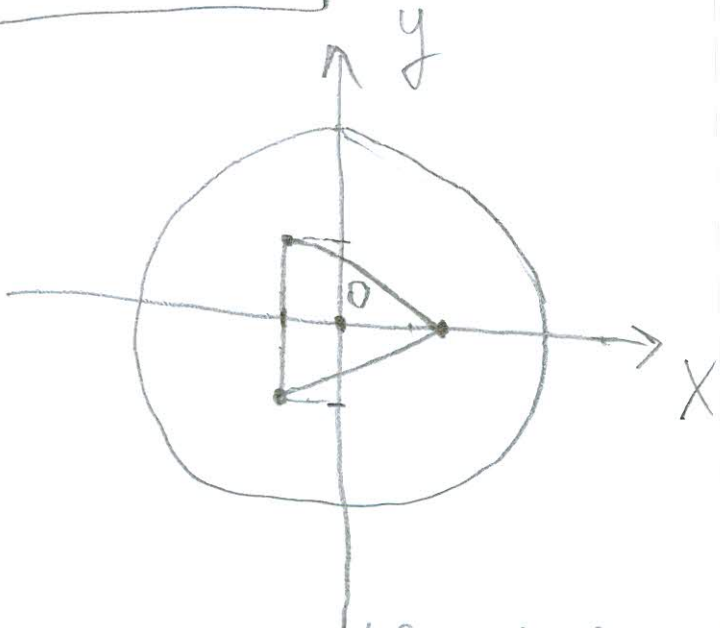
$$z_1 = \sqrt[3]{5.83} \left[-0.5 + i \cdot 0.86 \right]$$

$$\boxed{z_1 = -0.89 + 1.54i}$$

$$z_2 = \sqrt[3]{5.83} \cdot \left[\cos\left(\frac{2 \cdot 2 \cdot \pi}{3}\right) + i \cdot \sin\left(\frac{2 \cdot 2 \cdot \pi}{3}\right) \right]$$

$$z_2 = \sqrt[3]{5.83} \left[-0.5 + i \cdot (-0.86) \right]$$

$$\boxed{z_2 = -0.89 - 1.55i}$$



Ako tražimo n-ti korjen iz kompleksnog broja moramo imati n rješenja

Kod trećeg korjena kompleksnog broja ako je dobro rađilo treba dobiti jednakostranični trokut.

STIPE PREDOVAN

5.) Riješi sustav Gaussovom metodom i obrazmo provjeri rješenje.

$$\boxed{x, y, u, z}$$

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

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

$$\left[\begin{array}{cccc|c} 1 & -1 & 1 & 2 & 2 \\ 0 & 3 & -5 & -4 & 0 \\ 4 & -1 & 2 & 1 & -1 \\ 2 & 1 & -4 & 1 & 7 \end{array}\right] \quad \cdot(-4) \text{ na } +$$

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

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

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

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

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

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

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

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

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

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

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

BESKONAČNO RJEŠENJA...

AKO MINJAN REDKE PONIŠTIT ĆU ONO ŠTO SAN DOBRO NAPRAVIJA.

$$\left[\begin{array}{l} x = -2 \\ y = -5 \\ u = -3 \\ z = 0 \end{array}\right]$$

PROVJERA...?

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

$h(x) = x^2 + 2\pi^{\frac{1}{2}}$

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

$h'(x) = 2x + \underline{3.14} - \underline{0.5}$

$h'(x) = 2x + 2.64$ PRVA DERIVACIJA

2) $g(x) = \sqrt{x^2+3} = x^2 + 3^{\frac{1}{2}}$

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

$g'(x) = 2x + 1.5^{-\frac{1}{2}}$

$g'(x) = 2x + \frac{1}{1.5^{\frac{1}{2}}}$

$g'(x) = 2x + \frac{1}{\sqrt{1.5}}$

STIRE PREDOVAN

6) Odrediti prvu derivaciju funkcije

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

FUNKCIJA $2x^2-1$ je umnožak kosinusa a onda za je umnožak ln-a, ovo je složena funkcija ili funkcija.

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

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

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

$$\frac{f' \cdot g - f \cdot g'}{(2 \cdot g)^2}$$

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

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

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

Ako imamo $\frac{-1 \cdot \sin}{\cos}$ PIŠEMO $-\operatorname{tg}$