MATEMATIKA 1: Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata. **PIŠITE DVOSTRANO!** Obavezno popuniti sva polja ispod⇊ I1

IME I PREZIME: MATHIAS (RIZEL) **BROJ INDEKSA:** 17-2-0329-2013

POPUNJAVA NASTAVNIK Broj ↓ bodova

1. Riješi jednadžbu među kompleksnim brojevima: $z^4 - 4 + 2i = 0$. *Prikaži rješenja u kompleksnoj ravnini!* 15+3

2. Gaussovom metodom riješi sustav linearnih jednadžbi, a zatim provjeri uvrštavanjem:

$$\begin{aligned} x + 2y - z + u &= -1 \\ 2x + 5y - z + 2u &= -2 \\ 3x - y - 2z + u &= 5 \\ x - y + 3z - 5u &= 6 \end{aligned}$$

Provjeri uvrštavanjem! 16+3

3. Ispitati domenu i sve asimptote funkcije $g(x) = (\sqrt{x^2 + x} - x)$. 5+15

4. Ispitati tok i nacrtati graf funkcije: $h(x) = \frac{x^2-4}{x^2+2}$. 20(graf)

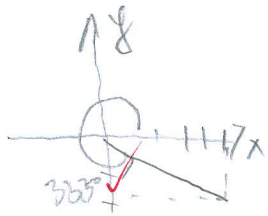
5. Odrediti prvu derivaciju funkcije: $f(x) = \ln(\sin(4x - 2))$. 15

6. Izračunati rang matrice: $\begin{bmatrix} 2 & 3 & 0 & -2 & 0 \\ 0 & 1 & 4 & -2 & 1 \\ 1 & 1 & 0 & 4 & -2 \\ 0 & 1 & 0 & 2 & 4 \end{bmatrix}$. 8

Ukupno: 59

1. $z^4 - 4 + 2i = 0$

$z^4 = 4 - 2i$



$N = \sqrt{x^2 + y^2} = \sqrt{4^2 + (-2)^2} = \sqrt{20}$

$\operatorname{tg}\varphi = \frac{y}{x} = -\frac{2}{4} = -\frac{1}{2} = -26{,}5^\circ \approx 27^\circ = \frac{3\pi}{20}$

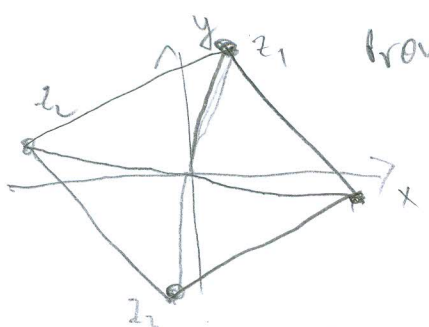
$z^4 = \sqrt{20} \cdot (\cos\frac{3\pi}{20} + i\sin\frac{3\pi}{20})$

$k=0 \Rightarrow z_1 = \sqrt[4]{\sqrt{20}} \cdot (\cos\frac{3\pi}{80} + i\sin\frac{3\pi}{80})$

$k=1 \Rightarrow z_2 = \sqrt[4]{\sqrt{20}} \cdot (\cos\frac{77\pi}{80} + i\sin\frac{77\pi}{80})$

$k=2 \Rightarrow z_3 = \sqrt[4]{\sqrt{20}} \cdot (\cos\frac{117\pi}{80} + i\sin\frac{117\pi}{80})$

$k=3 \Rightarrow z_4 = \sqrt[4]{\sqrt{20}} \cdot (\cos\frac{157\pi}{80} + i\sin\frac{157\pi}{80})$



provjera

$\frac{27\pi}{180} = \frac{3\pi}{60} = \frac{3\pi}{20}$

$\frac{3335}{180} = \frac{1111 - 37\pi}{60} = \frac{37\pi}{20}$

$\frac{37\pi}{20} + \frac{4\pi}{1} = \frac{37\pi + 80\pi}{20} = \frac{117\pi}{20}$

$\frac{37\pi}{20} \quad \frac{37\pi}{80}$

$2 \cdot 3 \cdot \pi$

$\frac{37\pi}{20} \cdot \frac{1}{4}$

$\frac{2\pi}{4} = \frac{37\pi}{20} + \frac{2\pi}{1} = \frac{37\pi + 40}{20}$

$\frac{77\pi}{20} \cdot \frac{4}{1}$

$\frac{117\pi}{20} \cdot \frac{1}{4}$

$\frac{77\pi}{80}$

$\frac{37\pi}{20} + \frac{6\pi}{1} = \frac{37\pi + 120}{20}$

$\frac{117\pi}{80}$

$\frac{157\pi}{20} \cdot \frac{1}{4} = \frac{157\pi}{80}$

MATHIAS GRIBELJ

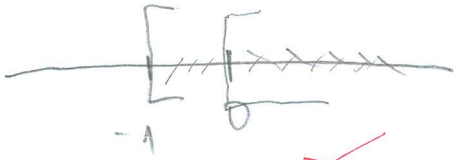
3. $g(x)=\left(\sqrt{x^2+x}-x\right)$ $\quad 1^0\ x^2+x\geq 0$

$x(x+1)\geq 0$

$\boxed{x\geq 0}$

$x+1\geq 0$

$\boxed{x\geq -1}$



$D(g)=\langle -\infty,-1\rangle \cup [1+\infty\rangle$ ✗

$\langle -\infty,-1]\cup[1,+\infty\rangle$ ✗

VERTIKALNE NEMA

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

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

$y=\frac{1}{2}$ je H.A. (DESNA)

KOSE NEMA

✗

5. $f(x)=\ln(\sin(4x-2))=\frac{1}{\sin(4x-2)}\cdot\cos(4x-2)\cdot 4=\frac{\cos(4x-2)\cdot 4}{\sin(4x-2)}$ ✓

MATHIAS GRIZELJ

4. $h(x) = \frac{x^2-4}{x^2+2}$

1° $x^2+2 \neq 0$

$x^2 \neq -2$

$x \neq \pm\sqrt{-2} \in \mathbb{R}$

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

2° Nultočke

$x^2-4=0$

$(x-2)(x+2)=0$

$x=2 \quad , \quad x=-2$

$T_0(2,0) \; , \; T_0(-2,0)$

3° Ekstremi

$f(x) = \frac{x^2-4}{x^2+2} \quad \frac{u}{v} \; , \; f'(x) = \frac{u' \cdot v - u \cdot v'}{v^2} = \frac{2x \cdot (x^2+2) - (x^2-4 \cdot 2x)}{(x^2+2)^2} =$

$\frac{2x^3+4x-(2x^3-8x)}{(x^2+2)^2} = \frac{2x^3+4x-2x^3+8x}{(x^2+2)^2} = \frac{12x}{(x^2+2)^2}$

f

PARNOST i NEPARNOST

$f(-x) = \frac{(-x)^2-4}{(-x)^2+2} = \frac{x^2-4}{x^2+2}$; $f(x)$ je parna

$f''(x) = \frac{x^2}{(x^2+2)^2} = \frac{u}{v} = \frac{u' \cdot v - u \cdot v'}{v^2} = 2x \cdot ($

4° ASIMPTOTE

$\lim_{x \to \infty} \frac{x^2-4}{x^2+2} \quad / : x^2 = \lim_{x \to \infty} \frac{\frac{x^2}{x^2} - \frac{4}{x^2}}{\frac{x^2}{x^2} + \frac{2}{x^2}} = \frac{1-0}{1+0} = 1 \quad y=1$ je H.A

V. A. NEMA

K. A. NEMA