

MATEMATIKA 2

14. lipnja 2012.

Ime i prezime: Igor Brajica Broj indeksa: 52803-2005

Vrijeme: od 08:20 do _____ ♣1

Broj bodova: 0

Trajanje ispita je 120 minuta. Ispit se održava sukladno objavljenim pravilima. Na snazi je Pravilnik o stegovnoj odgovornosti studenata.

1. (15) Integriraj

$$\int_0^{\infty} \frac{e^{\frac{1}{x}}}{x^2} dx$$

2. (20) Integriraj

$$\int_2^3 \frac{x^2 + x + 3}{x^2 - 1} dx$$

3. (20) Odredi površinu koju zatvaraju krivulja $x + 2 = y^2$ i pravac $2y = x + 2$.

4. (10+10)

a) Ispitaj ekstreme funkcije

$$f(x, y) = \underline{\underline{2xy - 3x^2 - 2y^2 + 3}}$$

b) Odredi domenu funkcije:

$$f(x, y) = \sqrt{16 - x^2 - y^2}$$

5. (10+15) Riješi sljedeće diferencijalne jednadžbe:

a)

$$xy' + y = \underline{\underline{1}}$$

b)

$$y'' + 4y' + 5y = \underline{\underline{10}}$$

PISATI JEDNOSTRANO!

NA SVAKI LIST PAPIRA

1

NAPISATI IME I PREZIME!

IME I PREZIME: Igov Bravica

BROJ INDEKSA:

5) b) $y'' + 4y' + 5y = 10$

$$\lambda^2 + 4\lambda + 5 = 10$$

$$\lambda^2 + 4\lambda - 5 = 0$$

$$\lambda_{1,2} = \frac{-4 \pm \sqrt{16 + 20}}{2}$$

$$\lambda_{1,2} = \frac{-4 \pm \sqrt{36}}{2}$$

OVO JE RIJEŠENJE HOMOGENE,
A NE NEHOMOGENE ODJ.

$$\lambda_{1,2} = \frac{-4 \pm 6}{2}$$

$$\lambda_1 = 1 \quad \lambda_1 \neq \lambda_2$$

$$\lambda_2 = -5$$

$$y = C_1 e^{\lambda_1 x} + C_2 e^{\lambda_2 x} \quad y = C_1 e^x + C_2 e^{-5x}$$

4) $f(x,y) = 2xy - 3x^2 - 2y^2 + 3$

a) $\frac{\partial f}{\partial x} = 2y - 6x$
 $\frac{\partial f}{\partial y} = 2x - 4y$

$$\left. \begin{array}{l} 2y - 6x \\ -4y + 2x \end{array} \right\} \cdot 2$$

$$4y - 12x = 0$$

$$-4y + 2x = 0$$

$$-10x = 0$$

$$x = 0$$

$$2y - 6 \cdot 0 = 0$$

$$2y = 0$$

$$y = 0$$

$$(0, 0) \checkmark$$

$$\frac{\partial^2 f}{\partial x^2} = -6 \quad A$$

$$\frac{\partial^2 f}{\partial x \partial y} = 2 \quad B$$

$$\frac{\partial^2 f}{\partial y^2} = -4 \quad C$$

$$T(0, 0)$$

$$\Delta = A \cdot C - (B)^2$$

$$\Delta = -6 \cdot (-4) - (2)^2$$

$$\Delta = 24 - 4 = 20 > 0 \text{, min}$$

ERSTREM PUSTO) \checkmark

NIJE MINIMUM NEGO
MAKSIMUM

$$f(x,y) = 2 \cdot 0 \cdot 0 - 3 \cdot (0)^2 - 2(0)^2 + 3$$

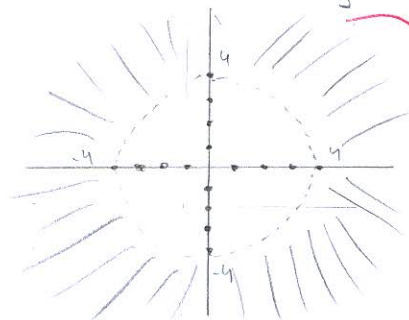
$$f_{\text{min}} = 3$$

b) $f(x,y) = \sqrt{16 - x^2 - y^2}$

$$16 - x^2 - y^2 > 0$$

$$-x^2 - y^2 = -16 \quad | \cdot (-1)$$

$$x^2 + y^2 = 16 \quad r^2$$



VANJSKI DIO

UNUTRA
 $x^2 + y^2 \leq 4^2$

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BROJ INDEKSA:

PRJE JE TREBACO PODIJELITI!

$$2) \int \frac{x^2 + x - 3}{x^2 - 1} = \frac{x^2 + x - 3}{(x-1)(x+1)}$$

$$\int \frac{x^2 + x - 3}{(x-1)(x+1)} = \frac{A}{x-1} + \frac{B}{x+1} \quad \checkmark \text{ DAJE.}$$

$$\textcircled{1} \int_0^8 \frac{e^{\frac{1}{x}}}{x^2} dx \quad \left| \begin{array}{l} x^2 = u \\ 2x dx = du \\ e^x = v \end{array} \right. \int e^{\frac{1}{x}} dx$$

$$\int_0^8 x^2 e^x - 2 \int e^x \cdot x dx$$

$$\int_0^8 x^2 e^x - 2 e^x \cdot \frac{x^2}{2} \quad \times \quad \phi$$

$$\int_0^8 e^x ($$

PAZI! NEPRAVI INTEGRAL!

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BROJ INDEKSA:

3) $x + 2 = y^2$

$2y = x + 2$

$-y^2 = -x - 2$ - **POGRESNO PREPISANO**

NUL. TOČKE

TRJEME

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

$2y = -1 \quad | :2$

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

$y = -\frac{1}{2}$

$x_{1,2} = \frac{-1 \pm \sqrt{9}}{-2}$

$x + 2 = y^2$

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

$x_1 = -1$

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

$x_2 = 2$

$x = \frac{1}{4} - 2 = \frac{1 - 8}{4} = -\frac{7}{4}$

$T\left(-\frac{7}{4}, -\frac{1}{2}\right)$

SPREMITA

$x + 2 = y^2 = 2y$

$-x + 2 = x + 2$



RJEŠENJE ?

~~Q~~