Rješenja ponovljenog završnog ispita iz Matematike 3E
02.02.2009.

Pitanja iz 3. ciklusa nastave

1. (4 boda)
b) (**1b**)

$$x = 1 + 2t^2, \quad y = -1 + t^2, \quad z = t, \qquad t \in \mathbb{R}$$

c) (**1b**)

$$t_1 = 1, \quad t_2 = 2$$

d) (**1b**)

$$\mathbf{v}'(t) = \lim_{h \to 0} \frac{\mathbf{v}(t+h) - \mathbf{v}(t)}{h} = \cdots = v_1'(t)\mathbf{i} + v_2'(t)\mathbf{j} + v_3'(t)\mathbf{k}$$

2. (3 boda)
a) (**2b**)

$$\nabla \left(\frac{1}{\mathbf{a} \cdot \mathbf{r}} \right) = -\frac{\nabla(\mathbf{a} \cdot \mathbf{r})}{(\mathbf{a} \cdot \mathbf{r})^2} = -\frac{\mathbf{a}}{(\mathbf{a} \cdot \mathbf{r})^2}$$

b) (**1b**)

$$div(rot\, \mathbf{a}) = \cdots = 0$$

3. (3 boda)

$$l = 5$$

4. (5 bodova)
a) (**1b**) Vektorska analiza, str.58, teorem 3.
b) (**2b**)

$$rot\, \mathbf{f} = 0 \quad \Rightarrow \quad \text{polje } \mathbf{f} \text{ je potencijalno}, \quad p(x, y, z) = \ln(xyz) + C$$

c) (**2b**)

$$\int_A^B (\cdots) = p(B) - p(A) = \ln(24)$$

5. (3 boda)

$$\iint_S dS = \frac{\pi}{24} \left(5\sqrt{5} - 1 \right)$$

6. (4 boda)
a) (**1b**) Vektorska analiza, str.80, teorem o divergenciji.
b) (**3b**)

$$\iint_S \mathbf{a} \cdot \mathbf{n}\, dS = \frac{32}{3} (8 + \pi)$$

7. (3 boda)

$$\oint_C \mathbf{v}\, d\mathbf{r} = \frac{3\pi}{2}$$

Pitanja iz cijelog gradiva

8. (4 boda)

a) (**1b**) Fourierov red i integral, Laplaceova transformacija, str.44, definicija.

b) (**3b**)

$$f(x) = \frac{2}{\pi} \int_0^\infty \frac{\cos(\lambda x)}{\lambda^2 + 1}\, d\lambda$$

9. (4 boda)

a) (**2b**) Fourierov red i integral, Laplaceova transformacija, str.66, poglavlje 4.Polinomi.

b) (**1b**) Fourierov red i integral, Laplaceova transformacija, str.72, teorem o pomaku originala.

c) (**1b**)

$$e^{-s} \cdot \frac{2}{s^3}$$

10. (4 boda)

$$I = \frac{4\pi}{3}\sqrt{2}$$

11. (3 boda)

a) (**1b**)

$$2\mathbf{i} + 2\mathbf{j} + 2\mathbf{k}$$

b) (**1b**) Vektorska analiza, str.30, definicija.

c) (**1b**)

$$\frac{2}{\sqrt{3}}x\mathbf{i} + \frac{2}{\sqrt{3}}y\mathbf{j} - \frac{2}{\sqrt{3}}z\mathbf{k}$$