

4. kontrolna naloga  
1. A, 4. 4. 2023

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dosežene točke	možne točke	odstotki	ocena
28	35	80	4

ČAS PISANJA: 45 minut

1. Izračunaj natančno vrednost izraza. Rezultat naj bo delno korenjen.

[6t] 4

$$(\sqrt{8} + 3)^2 - 11 \cdot 0,3\overline{6} + \frac{\sqrt{12 + 6\sqrt{3}}}{\sqrt{3} + 3} =$$

$$\begin{aligned} & 8 + 6\sqrt{8} + 9 - 11 \cdot \frac{4}{11} + \frac{(\sqrt{3}-3)\sqrt{12+6\sqrt{3}}}{(\sqrt{3}+3)(\sqrt{3}-3)} = \\ & = 17 + 6\sqrt{8} - 4 + \frac{(\sqrt{3}-3)\sqrt{12+6\sqrt{3}}}{3-9} = \\ & = 13 + 6\sqrt{8} + \frac{\sqrt{(\sqrt{3}-3)^2(12+6\sqrt{3})}}{-6} = \\ & = 13 + 6\sqrt{8} + \frac{\sqrt{(3-6\sqrt{3}+9)(12+6\sqrt{3})}}{-6} = \\ & = 13 + 6\sqrt{8} + \frac{\sqrt{(12-6\sqrt{3})12+6\sqrt{3}}}{-6} = 13 + 6\sqrt{8} + \frac{\sqrt{144 - 36 \cdot 3}}{-6} = \\ & = 13 + 6\sqrt{8} + \frac{\sqrt{36}}{-6} = 13 + 6\sqrt{8} + \frac{6}{-6} = 13 + 6\sqrt{8} - 1 = 12 + 6\sqrt{8} = \\ & = 12 + 12\sqrt{2} = 12(1 + \sqrt{2}) \end{aligned}$$

$$\begin{aligned} 0,3\overline{6} &= x \\ 36,3\overline{6} &= 100x \\ \underline{36} &= 99x \\ x &= \frac{36,3\overline{6} - 36}{99} = \frac{0,3\overline{6}}{99} = \frac{124}{99 \cdot 33} = \frac{124}{3267} = \frac{4}{11} \end{aligned}$$

2. Znotraj univerzalne množice  $U = \mathbb{R}$  so dani intervali  $I_1 = (-\infty, 1)$ ,  $I_2 = (-1, 4]$  in  $I_3 = [1, \infty)$ . Zapiši interval  $I = (I_2 - I_3)^c \cap I_1$ .

[3t] 3

$$I_4 = I_2 - I_3 = (-1, 1) \checkmark$$

$$I_4^c = (-\infty, -1] \cup [1, \infty) \checkmark$$

$$\begin{aligned} I &= ((-\infty, -1] \cup [1, \infty)) \cap (-\infty, 1) = \\ &= (-\infty, -1] \checkmark \end{aligned}$$

3. Reši enačbo:  $(x+1)^3 - 2(x-2)^2 = 7(2x - \frac{5}{7}) - x$ . Zapiši vse realne rešitve. [6t] 6

$$x^3 + 3x^2 + 3x + 1 - 2(x^2 - 4x + 4) = 14x - 5 - x$$

$$x^3 + 3x^2 + 3x + 1 - 2x^2 + 8x - 8 = 13x - 5$$

$$x^3 + x^2 + 11x = -5 + 7 + 13x$$

$$x^3 + x^2 - 2x = 2$$

~~$$x(x^2 + x - 2) = 2$$~~  
~~$$x(x+2)(x-1) = 2$$~~

$$x \in \{-1, -\sqrt{2}, \sqrt{2}\}$$

~~$$x^3 + x^2 - 2x - 2 = 0$$~~ ✓

$$x^2(x+1) - 2(x+1) = 0$$

$$(x+1)(x^2 - 2) = 0$$
 ✓

4. Reši sistem linearnih neenačb:  $\frac{x+3}{2} - \frac{x-4}{3} > 2$  in  $(x-3)^2 + 4 \geq (x-3)(x+3) + 5x$ . [5t] 4

$$\frac{x+3}{2} - \frac{x-4}{3} > 2 \quad / \cdot 6$$

$$(x-3)^2 + 4 \geq (x-3)(x+3) + 5x$$

$$3(x+3) - 2(x-4) > 12$$

$$3x+9-2x+8 > 12 \quad x > 12-17$$

$$(x-3)^2 + 4 \geq (x-3)(x+3) + 5x$$

$$x > -5$$

~~$$3x+9$$~~

$$x^2 - 6x + 9 + 4 \geq x^2 - 9 + 5x$$

$$-11x \geq -12$$

$$x \leq 2$$
 ✓

$$-5 < x \leq 2$$
 ✓

$$x \in (-5, 2]$$

6. Za napolnitev bazena imamo na voljo tri cevi. Prva bi samostojno napolnila bazen v petih, druga pa v petnajstih urah. Polnjenja bazena se lotimo tako, da najprej za tri ure odpremo prvo in drugo cev. Nato ju obe zapremo in odpremo tretjo cev. Tretja cev je odprta dve uri, nato jo zapremo in ugotovimo, da je prazna še  $\frac{1}{10}$  bazena. V kolikšnem času tretja cev samostojno napolni celoten (prazen) bazen? Zapiši odgovor.

[6t] 6

	sem.	delo v 1 h
1. cev	5	$\frac{1}{5}$
2. cev	15	$\frac{1}{15}$
3. cev	x	$\frac{1}{x}$

$$\frac{3}{5} + \frac{3}{15} + \frac{2}{x} = \frac{9}{10} \quad | \cdot 30x$$

~~$$3 \cdot 6x + 3 \cdot 2x + 60 = 9 \cdot 3x$$~~

$$3 \cdot 6x + 3 \cdot 2x + 60 = 9 \cdot 3x$$

$$18x + 6x - 27x = -60$$

$$24x - 27x = -60$$

$$-3x = -60$$

$$\underline{x = 20}$$

O: ~~3.~~ 3. cev samostojno  
zapolni celoten bazen  
✓ 20 urah.

DODATNA NALOGA: Izračunaj:  $\sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}}$ .

[3t] 0

$$x = \sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}} = \cancel{20 + 14\sqrt{2}} + \cancel{20 - 14\sqrt{2}}$$

$$x^3 = 20 + 14\sqrt{2} + 20 - 14\sqrt{2}$$

$$x^3 = 40$$

$$x = \sqrt[3]{40}$$

$$x^3 = 20 + 14\sqrt{2} + 2$$

$$\left( \sqrt[3]{20 + 14\sqrt{2}} + \sqrt[3]{20 - 14\sqrt{2}} \right)^3 = \cancel{20 + 14\sqrt{2}} + \cancel{20 - 14\sqrt{2}} +$$