R/.

Matematika (PITUP)
Zadaća 1: Logika sudova. Formule algebre sudova.

1. Napišite kontrapozicije sljedećih implikacija:

   - Ako je $2n$ paran, tada je $2n+1$ neparan broj.
   - Ako je broj paran tada je njegov kvadrat djeljiv s 4.
   - Ako je $\sqrt{3} \in \mathbb{Q} \vee 4^3 = 12$ tada svaki paran broj dijeli 4.

2. Provjerite da li su sljedeće formule

   - $x \wedge \overline{y} \wedge \overline{z}$
   - $\overline{x} \wedge y \wedge z$
   - $x \wedge y \wedge \overline{z}$
   - $\overline{x} \vee \overline{y} \vee z$
   - $x \vee \overline{y} \vee \overline{z}$

   bazične konjunkcije odnosno disjunkcije funkcije
   $F(x,y,z) = ((x \vee y) \wedge z) \Leftrightarrow \overline{\overline{y} \wedge x}$

3. Izradite semantičke tablice za funkcije algebre sudova:

   - $F(x,y,z) = ((x \vee y) \wedge z) \Leftrightarrow \overline{\overline{y} \wedge x}$
   - $F(x,y,z) = (x \Rightarrow (x \vee \overline{z})) \vee (\overline{y} \Leftrightarrow z)$

② $F(x,y,z) = \underbrace{((x \vee y) \wedge \bar{z})}_{A} \Leftrightarrow \underbrace{\overline{\bar{y} \wedge x}}_{B}$

x	y	z	$\bar{y}$	$x \vee y$	A	$\bar{y} \wedge x$	$\overline{\bar{y} \wedge x} = B$	$A \Leftrightarrow B$
0	0	0	1	0	0	0	1	0
0	0	1	1	0	0	0	1	0
0	1	0	0	1	0	0	1	0
0	1	1	0	1	1	0	1	1
1	0	0	1	1	0	1	0	1
1	0	1	1	1	1	1	0	0
1	1	0	0	1	0	0	1	0
1	1	1	0	1	1	0	1	1

x	y	z	F	BAZ DISJUNKCIJE	BAZ KONJUNKCIJA
0	0	0	0	$\rightarrow \bar{x} \vee \bar{y} \vee \bar{z}$	
0	0	1	0	$\rightarrow \bar{x} \vee \bar{y} \vee z$	
0	1	0	0	$\rightarrow \bar{x} \vee y \vee \bar{z}$	
0	1	1	1		$\bar{x} \wedge y \wedge z$
1	0	0	1		$x \wedge \bar{y} \wedge \bar{z}$
1	0	1	0	$\rightarrow x \vee \bar{y} \vee z$	
1	1	0	0	$\rightarrow x \vee y \vee \bar{z}$	
1	1	1	1		$x \wedge y \wedge z$

$DNF(F) = (\bar{x} \wedge y \wedge z) \vee (x \wedge \bar{y} \wedge \bar{z}) \vee (x \wedge y \wedge z)$

$KNF(F) = (\bar{x} \vee \bar{y} \vee \bar{z}) \wedge (\bar{x} \vee \bar{y} \vee z) \wedge (\bar{x} \vee y \vee z) \wedge (x \vee y \vee \bar{z})$

(3.) $F=(x,y,z) = ((x \vee y) \wedge z) \Leftrightarrow \overline{y} \wedge x$ => PRETHODNO

$F=(x,y,z) = \underbrace{(x \Rightarrow (x \vee \overline{z}))}_{A} \vee \underbrace{(\overline{y} \Leftrightarrow z)}_{B}$

x	y	z	$\overline{z}$	$\overline{y}$	$x \vee \overline{z}$	A	B	F
0	0	0	1	1	1	1	0	1
0	0	1	0	1	0	1	0	1
0	1	0	1	0	1	1	1	1
0	1	1	0	0	0	1	1	1
1	0	0	1	1	1	1	1	1
1	0	1	0	1	1	1	1	1
1	1	0	1	0	1	1	0	1
1	1	1	0	0	1	1	0	1

(1) • Ako je $2n+1$ paran broj, tada je $2n$ neparan

• Ako kvadrat nekog broja nije djeljiv s 4, tada taj broj nije paran

• Ako svaki paran broj ne djeljiv s 4, tada

$\sqrt{3} \notin Q \vee 4^3 = R$

Matematika (PITUP)
- Zadaća 2 -

(Formule algebre sudova.)

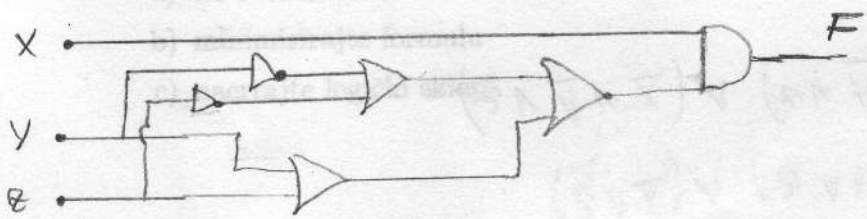
1. Riješite zadatke 27. g) - j) iz Zbirke zadataka, str. 35.
2. Za funkcije algebre sudova iz prošlog zadatka odredite:
   a) DNF ili KNF
   b) minimizirajte formulu
   c) nacrtajte logički sklop

a) $F(x,y,z) = \overline{(((\bar{y} \wedge z) \Rightarrow x) \Rightarrow (\bar{x} \vee \bar{y}))} \Leftrightarrow (x \wedge \bar{z})$

A

x	y	z	$\bar{x}$	$\bar{y}$	$\bar{z}$	$\bar{x} \vee \bar{y}$	$\bar{y} \wedge z$	$(\bar{y} \wedge z) \Rightarrow x$	A	$x \wedge \bar{z}$	F	b. k
0	0	0	1	1	1	1	0	1	1	0	0	
0	0	1	1	1	0	1	1	1	1	0	0	
0	1	0	1	0	1	0	0	1	1	0	0	
0	1	1	1	0	0	0	0	1	1	0	0	
1	0	0	0	1	1	0	0	1	1	1	1	$x \wedge \bar{y} \wedge \bar{z}$
1	0	1	0	1	0	0	1	1	1	0	0	
1	1	0	0	0	1	0	0	0	0	1	0	
1	1	1	0	0	0	0	0	1	0	0	1	$x \wedge y \wedge z$

(2) a) $DNF(F) = (x \wedge y \wedge z) \vee (x \wedge \bar{y} \wedge z) = x \wedge (y \vee z) \vee (\bar{y} \vee \bar{z})$

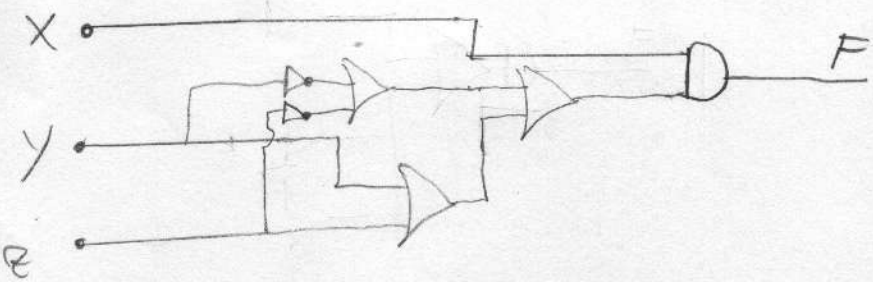


① d) $F(x,y,z) = \underbrace{((y \Rightarrow (\bar{x} \wedge z)) \vee (\bar{y} \vee z))}_{A} \Leftrightarrow \underbrace{(z \Leftrightarrow (\bar{y} \wedge x))}_{B}$

x	y	z	$\bar{x}$	$\bar{y}$	$\bar{x} \wedge z$	$y \Rightarrow (\bar{x} \wedge z)$	$\bar{y} \vee z$	A
0	0	0	1	1	0	1	1	
0	0	1	1	1	1	1	1	
0	1	0	1	0	0	0	0	
0	1	1	1	0	1	1	1	
1	0	0	0	1	0	1	1	
1	0	1	0	1	0	1	1	
1	1	0	0	0	0	0	0	
1	1	1	0	0	0	0	1	

② d) $DNF(F) = (x \wedge \bar{y} \wedge z) \vee (\bar{x} \wedge \bar{y} \wedge \bar{z})$

$= \bar{y} \wedge (x \vee z) \vee (\bar{x} \vee \bar{z})$



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Matematika (PITUP)
Zadaća 4: Skupovi. Relacije

1. Koji su od navedenih skupova međusobno jednaki: $A = \{a, b\}$, $B = \{b, a\} \cup \varnothing$, $C = \{a, b\} \cup \{\varnothing\}$, $D = \{\varnothing, a, b\}$, $E = \{a, b, \varnothing\} \cup \{a\}$?

2. Neka je $A = \{\diamondsuit, \clubsuit, \spadesuit\}$, $B = \{\clubsuit, \spadesuit, \{\diamondsuit\}\}$, $C = \{\diamondsuit, \{\spadesuit\}, \{\clubsuit\}\}$, $D = \{\{\clubsuit\}, \{\diamondsuit\}, \{\spadesuit\}\}$. Nađite:

   a) $C \cup D$

   b) $A \backslash B$

   c) $((B \cap D) \cup A) \setminus C$

   d) $(A \cap D) \cap B$.

3. Zadani su skupovi $M = \{x : (2x + 3)(x - 1) \leq 0, x \in \mathbb{Z}\}$ i $N = \{x : -3 < x < 1, x \in \mathbb{Z}\}$. Odredite:

   (a) $M \cup N$ (b) $N \cap M$
   (c) $M \setminus N$ (d) $N \times M$
   (e) $\mathcal{P}(N) \cap \mathcal{P}(M)$ (f) $\mathcal{P}(M \cap N)$

4. Ispitajte da li za bilo koje skupove A, B, C vrijedi:

   a) $(A \cup B) \cap C = A \cup (B \cap C)$? Ako ne vrijedi nađite kontraprimjer.

   b) $(A \setminus B) \setminus C \subseteq A \setminus (B \setminus C)$. Da li vrijedi jednakost? Obrazložite svoj odgovor!

5. Zadana je relacija $\rho = \{(a, b) \in S \mid b \text{ je višekratnik od } a\}$, $S = \{3, 4, 5, 6, 9, 10, 12\}$

   (a) Ispišite sve elemente zadane relacije.

   (b) Napišite tablicu incidencije.

   (c) Nacrtajte graf relacije.

   (d) Koja svojstva ima zadana relacija (refleksivnost, simetričnost, antisimetričnost, tranzitivnost)?

6. Riješite iz Zbirke zadataka zadatke:

   - Zadatak 4. (str.53.)
   - Zadatak 5. (str.53.)

① $A = \{a, b\}$

$B = \{b, a\} \cup \emptyset = \{a, b\}$

$C = \{a, b\} \cup \{\emptyset\} = \{a, b, \emptyset\}$

$D = \{\emptyset, a, b\}$

$E = \{ab, \emptyset\} \cup \{a\} = \{a, b, \emptyset\}$

② a) $C \cup D = \{\emptyset, \{\heartsuit\}, \{\clubsuit\}, \{\diamondsuit\}\}$

$C \cap D = \{\{\clubsuit\}, \{\heartsuit\}\}$

b) $A \setminus B = \{\diamondsuit\}$

c) $(B \cap D) = \{\{\diamondsuit\}\}$

$(B \cap D) \cup A = \{\{\diamondsuit\}, \diamondsuit, \clubsuit, \heartsuit\}$

$((B \cap D) \cup A) \setminus C = \{\{\diamondsuit\}, \clubsuit, \heartsuit\}$

d) $(A \cap D) \cap B = \emptyset$

③ a) $M \cup N = \{-2, -1, 0, 1\}$

b) $N \cap M = \{-1, 0\}$

c) $M \setminus N = \{1\}$

d) $N \times M = \{-2, -1, 0\} \times \{-1, 0, 1\} =$

$= \{(-2, 1), (-2, 0), (-2, 1)$

$(-1, 1), (-1, 0), (-1, 1)$

$(0, -1), (0, 0), (0, 1)\}$

e) $P(N) \cap P(M) = \{\emptyset, \{-1\}, \{0\}, \{-1,0\}\}$

$P(N) = \{\emptyset, \{-2\}, \{-1\}, \{0\}, \{-2,1\}, \{-2,0\}, \{-1,0\}\ N\}$

$P(M) = \{\emptyset, \{-1\}, \{0\}, \{1\}, \{-1,0\}, \{-1,1\}, \{0,1\}, M\}$

4. $(A \cup B) \cap C = A \cup (B \cap C)$

A	B	C	$A \cup B$	$(A \cup B) \cap C$	$B \cap C$	$A \cup (B \cap C)$	
$\notin$	$\notin$	$\notin$	$\notin$	$\notin$	$\notin$	$\notin$	
$\notin$	$\notin$	$\in$	$\notin$	$\notin$	$\notin$	$\notin$	
$\notin$	$\in$	$\notin$	$\in$	$\notin$	$\notin$	$\notin$	
$\notin$	$\in$	$\in$	$\in$	$\in$	$\in$	$\in$	
$\in$	$\notin$	$\notin$	$\in$	$\notin$	$\notin$	$\in$	*
$\in$	$\notin$	$\in$	$\in$	$\in$	$\notin$	$\in$	
$\in$	$\in$	$\notin$	$\in$	$\notin$	$\notin$	$\in$	*
$\in$	$\in$	$\in$	$\in$	$\in$	$\in$	$\in$	

$=$

5. $R = \{(a,b) \in S \mid b$ je višekratnik od $a\}$

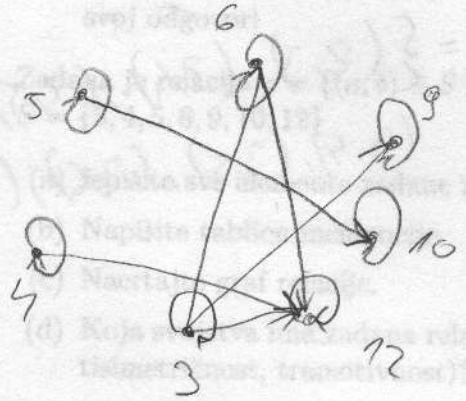
$S = \{3, 4, 5, 6, 9, 10, 12\}$

a) $P = \{(3,3), (3,6), (3,9), (3,12)$
$(4,4), (4,12), (5,5), (5,10)$
$(6,6), (6,12), (9,9), (10,10), (12,12)\}$

b)

a \ b	3	4	5	6	9	10	12
3	1	0	0	1	1	0	1
4	0	1	0	0	0	0	1
5	0	0	1	0	0	1	0
6	0	0	0	1	0	0	1
9	0	0	0	0	1	0	0
10	0	0	0	0	0	1	0
12	0	0	0	0	0	0	1

c)



6 $R = \{(x,y) \mid x \text{ i } y \text{ nisu relativno prosti}\}$

$A = \{2,3,4,5,6,7,8\}$

x\y	2	3	4	5	6	7	8
2	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0
4	0	0	1	0	1	0	1
5	0	0	0	0	0	0	0
6	0	0	1	0	1	0	1
7	0	0	0	0	0	0	0
8	0	0	1	0	1	0	1

$f = \{(4,4),(4,6),(4,8),(6,4),(6,6),(6,8),(8,4),(8,6),(8,8)\}$

b) $R = \{(x,y) \mid x<y \wedge x \text{ je prost}\}$

$A = \{0,1,2,3,4,5,6\}$

x\y	0	1	2	3	4	5	6
0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0
2	0	0	0	1	1	1	1
3	0	0	0	0	1	1	1
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	1
6	0	0	0	0	0	0	0

$f = \{(2,3),(2,4),(2,5),(2,6),(3,4),(3,5),(3,6),(5,6)\}$

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Matematika (PITUP)
Zadaća 5: Relacije. Matrice.

1. Neka je $X = \{1, 2, 3, 4, 5\}$. Na X zadana je relacija $*$ sa

$$A * B \text{ ako je } \mathcal{P}(A) \subseteq \mathcal{P}(B)$$

Da li je $*$ relacija parcijalnog uređaja?

2. Zadana je relacija ρ podskup od $\mathbb{R} \times \mathbb{R}$ sa

$$a \,\rho\, b \text{ ako i samo ako je } a - b = 1.$$

Da li je ρ funkcija? Da li je ρ bijekcija?

3. Neka je na skupu $A = \{1, 2, 3, 4, 5\}$ zadana relacija

$$\pi = \{(2, 4), (3, 3), (5, 1), (1, 5), (4, 2)\}.$$

Da li je π funkcija? Odredi inverznu funkciju π^{-1}.

4. Provjeri da li je $f : \langle 0, 1\rangle \to \langle 1, 3\rangle$ zadana sa $f(x) = 2x^2 + 1$ bijekcija.

5. Iz Zbirke zadataka riješite sljedeće zadatke:

   - Zadatak 1.a), e) (str.80.)
   - Zadatak 5. (str.81.)
   - Zadatak 15. (str.86.)

$X = \{1, 2, 3, 4, 5\}$

$A \ast B$ ako i $P(A) \subseteq P(B)$

A\B	1	2	3	4	5
1	1	1	1	1	1
2	1	1	0	0	0
3	1	0	0	0	0
4	1	0	0	0	0
5	1	0	0	0	0

- REFLEKSIVNOST
  $(\forall X \in A)\ X \not\subset X$ ⊥
- ASIMETRIČNOST
  $(\forall X\ Y \in A)\ X \subset Y \wedge Y \subset X \Rightarrow X = Y$ T
- TRANZITIVNOST
  $(\forall X\ Y\ Z \in A)\ X \subset Y \wedge Y \subset Z \Rightarrow X \subset Z$ T

- $\{(1,1), (1,2), (1,3), (1,4), (1,5),$
  $(2,1), (2,2),$
  $(3,1),$
  $(4,1),$
  $(5,1)\}$

* NIJE RELACIJA PARCIJALNOG UREĐAJA

(2.) $3-2=1$
$2-1=1$
$4-3=1$

INJEKCIJA : $a_1 \neq a_2$ $b_1 \neq b_2$ ✓

SURJEKCIJA : $\forall b \in R\ \exists a \in R$ ✓

✗ JE FUNKCIJA JER $\forall a \in R\ \exists b \in R (a,b) \in f$

↯ INJEKCIJA ↯ SURJEKCIJA

(3.) $A = \{1, 2, 3, 4, 5\}$

$\pi = \{(2,4), (3,3), (5,1), (1,5), (4,2)\}$

$\pi^{-1} = \{(4,2), (3,3), (1,5), (5,1), (2,4\}$

(5) a)

$$A=\begin{bmatrix} 0 & 1 & 1 & 1 & 1 \\ 2 & 3 & 1 & 1 & 1 \\ 3 & 2/3 & 8 & 1 & 1 \\ 4 & 2 & 4/3 & 15 & 1 \end{bmatrix} \qquad A=\begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} & a_{15} \\ a_{21} & a_{22} & a_{23} & a_{24} & a_{25} \\ a_{31} & a_{32} & a_{33} & a_{34} & a_{35} \\ a_{41} & a_{42} & a_{43} & a_{44} & a_{45} \end{bmatrix}$$

e)

$$A=\begin{bmatrix} 1 & \log_2 3 & 2 & \log_2 5 \\ -1 & 2 & \log_2 5 & \log_2 6 \\ 0 & 0 & \log_2 6 & \log_2 7 \\ 1 & 1 & 1 & 3 \end{bmatrix} \qquad A=\begin{bmatrix} a_{11} & a_{12} & a_{13} & a_{14} \\ a_{21} & a_{22} & a_{23} & a_{24} \\ a_{31} & a_{32} & a_{33} & a_{34} \\ a_{41} & a_{42} & a_{43} & a_{44} \end{bmatrix}$$

ZAD 8.

$$A=\begin{bmatrix} 0 & 4 & a^3+7 \\ a-2 & 0 & 2a+1 \\ a^2-3 & 3 & a+2 \end{bmatrix} \quad a=-2 \qquad A=\begin{bmatrix} 0 & 4 & -1 \\ -4 & 0 & 3 \\ 1 & 3 & 0 \end{bmatrix}$$

ZAD 15.

A) $3A^2-4C$

$$C^2=\begin{bmatrix} 4 & -1 \\ 0 & 3 \end{bmatrix}\cdot\begin{bmatrix} 4 & -1 \\ 0 & 3 \end{bmatrix}=\begin{bmatrix} 16 & -7 \\ 0 & 9 \end{bmatrix}$$

$$3C^2=\begin{bmatrix} 48 & -21 \\ 0 & 27 \end{bmatrix}$$

$$4C=\begin{bmatrix} 16 & -4 \\ 0 & 12 \end{bmatrix}$$

$$3C^2-4C=\begin{bmatrix} 48 & -21 \\ 0 & 27 \end{bmatrix}-\begin{bmatrix} 16 & -4 \\ 0 & 12 \end{bmatrix}=\begin{bmatrix} 32 & -17 \\ 0 & 15 \end{bmatrix}$$

$A^T B$

$$A^T = \begin{bmatrix} 4 & 3 & 0 \\ -1 & -2 & 1 \\ 0 & 1 & -1 \end{bmatrix}$$

$$A^T B = \begin{bmatrix} 4 & 3 & 0 \\ -1 & -2 & 1 \\ 0 & 1 & -1 \end{bmatrix} \cdot \begin{bmatrix} 0 & -1 \\ -2 & 3 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} -6 & 5 \\ 5 & -4 \\ -3 & 3 \end{bmatrix}$$

$3 \times 3 \quad 3 \times 2$

c) $BC + 2B$

$$2B = 2 \cdot \begin{bmatrix} 0 & -1 \\ -2 & 3 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 0 & -2 \\ -4 & 6 \\ 2 & 0 \end{bmatrix}$$

$$BC = \begin{bmatrix} 0 & -1 \\ -2 & 3 \\ 1 & 0 \end{bmatrix} \cdot \begin{bmatrix} 4 & -1 \\ 0 & 3 \end{bmatrix} = \begin{bmatrix} 0 & -3 \\ -8 & 11 \\ 4 & -1 \end{bmatrix}$$

$$BC + 2B = \begin{bmatrix} 0 & -3 \\ -8 & 11 \\ 4 & -1 \end{bmatrix} + \begin{bmatrix} 0 & -2 \\ -4 & 6 \\ 2 & 0 \end{bmatrix} = \begin{bmatrix} 0 & -5 \\ -12 & 17 \\ 6 & -1 \end{bmatrix}$$

d) MATRICE NISU UCANČANE

Matematika (PITUP)

Zadaća 6: Relacije. Determinante.

1. Odredite $A \cdot B$ i $B \cdot A$ ako je

   a) $A = \begin{bmatrix} 1 & 3 & 0 & -1 \\ 2 & -1 & -3 & 0 \\ 5 & 1 & -1 & 0 \\ 7 & -1 & 0 & 1 \end{bmatrix}$ i $B = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix}$

   b) $A = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ 1 & 1 \end{bmatrix}$ i $B = \begin{bmatrix} 0 & 1 & 3 & 2 \\ 1 & 1 & 1 & 1 \end{bmatrix}$

2. Neka je $A = \begin{bmatrix} 2 & x \\ y & x^2 - 3y \end{bmatrix}$. Odredite $x, y \in \mathbb{R}$ takve da A bude:

   a) gornja trokutasta

   b) dijagonalna

   c) simetrična

   d) antisimetrična

3. Za zadane matrice $A = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ 1 & 1 \end{bmatrix}$ i $B = \begin{bmatrix} 0 & 1 & 3 \\ 1 & -1 & 1 \end{bmatrix}$ odredite:

   a) $3A - 2B^T$

   b) $B \cdot A + 5I$

   c) $A^T + B \cdot (-2I)$

4. Odredite determinante:

   a) $\begin{vmatrix} 2 & -3 \\ -1 & 2 \end{vmatrix}$ b) $\begin{vmatrix} 4 & -1 & 2 \\ 0 & -2 & 4 \\ 1 & -2 & -3 \end{vmatrix}$

5. Iz Zbirke zadataka riješite sljedeće zadatke:

   - Zadatak 18. (str.86.)
   - Zadatak 15. (str.98.)

a)

$$A \cdot B = \begin{bmatrix} 1 & 3 & 0 & -1 \\ 2 & -1 & -3 & 0 \\ 5 & 1 & -1 & 0 \\ 7 & -1 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix} =$$

$4 \times 4 \qquad 4 \times 4$

$$= \begin{bmatrix} 4 & 3 & 4 & 2 \\ 1 & -1 & 1 & -1 \\ 6 & 1 & 6 & 1 \\ 6 & -1 & 6 & 0 \end{bmatrix}$$

$$B \cdot A = \begin{bmatrix} 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 3 & 0 & -1 \\ 2 & -1 & -3 & 0 \\ 5 & 1 & -1 & 0 \\ 7 & -1 & 0 & 1 \end{bmatrix} = \begin{bmatrix} 6 & 4 & -1 & -1 \\ 15 & 2 & -4 & 0 \\ 0 & 0 & 0 & 0 \\ 8 & 2 & 0 & 0 \end{bmatrix}$$

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b)

$$A \cdot B = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 0 & 1 & 3 & 2 \\ 1 & 1 & 1 & 1 \end{bmatrix} = \begin{bmatrix} 2 & 3 & 5 & 4 \\ 0 & 2 & 6 & 4 \\ 1 & 2 & 4 & 3 \end{bmatrix}$$

$3 \times 2 \qquad 2 \times 4 \qquad\qquad 3 \times 4$

$$B \cdot A = \begin{bmatrix} 0 & 1 & 3 & 2 \\ 1 & 1 & 1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ 1 & 1 \end{bmatrix} = \text{MATRICE NISU ULANČANE}$$

$2 \times 4 \qquad 3 \times 2$

(2.) $A = \begin{bmatrix} 2 & x \\ y & x^2-3y \end{bmatrix}$ $x, y \in R$, da A bude:

a) G. TROKUTASTA

$A = \begin{bmatrix} 2 & 1 \\ 0 & 1 \end{bmatrix}$ $x = 1$, $y = 0$

b) DIJAGONALNA

$A = \begin{bmatrix} 2 & 0 \\ 0 & 0 \end{bmatrix}$ $x = 0$, $y = 0$

c) SIMETRIČNA

$A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ $x = -1$, $y = -1$

d) ANTISIMETRIČNA

NE MOŽE BITI JER NA GLAVNOJ DIJAGONALI TREBAJU BITI "0"

(3.) $A = \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ 1 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 0 & 1 & 3 \\ 1 & -1 & 1 \end{bmatrix}$

a) $3A - 2B^T$

$3 \cdot A = \begin{bmatrix} 3 & 6 \\ 6 & 0 \\ 3 & 3 \end{bmatrix}$ $2B = \begin{bmatrix} 0 & 2 & 6 \\ 2 & -2 & 2 \end{bmatrix}$ $2B^T = \begin{bmatrix} 0 & 2 \\ 2 & -2 \\ 6 & 2 \end{bmatrix}$

$3 \cdot A - 2B^T = \begin{bmatrix} 3 & 6 \\ 6 & 0 \\ 3 & 3 \end{bmatrix} - \begin{bmatrix} 0 & 2 \\ 2 & -2 \\ 6 & 2 \end{bmatrix} = \begin{bmatrix} 3 & 4 \\ 4 & 2 \\ -3 & 1 \end{bmatrix}$

$B \cdot A + 5I$

$$5I = \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix}$$

$$B \cdot A = \begin{bmatrix} 0 & 1 & 3 \\ 1 & -1 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 2 \\ 2 & 0 \\ 1 & 1 \end{bmatrix} = \begin{bmatrix} 5 & 3 \\ 0 & 3 \end{bmatrix}$$

$2 \times 3 \quad 3 \times 2$

$$B \cdot A + 5I = \begin{bmatrix} 5 & 3 \\ 0 & 3 \end{bmatrix} + \begin{bmatrix} 5 & 0 \\ 0 & 5 \end{bmatrix} = \begin{bmatrix} 10 & 3 \\ 0 & 8 \end{bmatrix}$$

c) $A^T + B \cdot (-2I)$

$$A^T = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 0 & 1 \end{bmatrix} \qquad -2 \cdot I = \begin{bmatrix} -2 & 0 \\ 0 & -2 \end{bmatrix}$$

$$B \cdot (-2I) = \begin{bmatrix} 0 & 1 & 3 \\ 1 & -1 & 1 \end{bmatrix} \cdot \begin{bmatrix} -2 & 0 \\ 0 & -2 \end{bmatrix} =$$

$2 \times 3 \quad 2 \times 2$

4. a)

$$\begin{vmatrix} 2 & -3 \\ -1 & 2 \end{vmatrix} = 2 \cdot 2 - (-1) \cdot (-3) = 1$$

b)

$$\begin{vmatrix} 4 & -1 & 2 \\ 0 & -2 & 4 \\ 1 & -2 & -3 \end{vmatrix} =$$

$$4 \cdot \begin{vmatrix} -2 & 4 \\ -2 & -3 \end{vmatrix} + 1 \cdot \begin{vmatrix} -1 & 2 \\ -2 & 4 \end{vmatrix} =$$

$$= 4 \cdot 14 + 1 \cdot 0$$

$$= 56$$

5.

$$A = \begin{bmatrix} a & b \\ 2 & 1 \end{bmatrix} \quad ; \quad B = \begin{bmatrix} 4 & 2 \\ 1 & 0 \end{bmatrix}$$

$AB = BA \qquad a = 9, \; b = 4$

$$AB = \begin{bmatrix} 40 & 18 \\ 9 & 4 \end{bmatrix}, \quad BA = \begin{bmatrix} 40 & 18 \\ 9 & 4 \end{bmatrix}$$

b/

$$D_1 = \begin{vmatrix} 2 & x & 0 \\ -4 & 3 & 1 \\ -5 & 0 & 5 \end{vmatrix} \begin{matrix} 2 & 4 \\ -4 & 3 \\ -5 & 0 \end{matrix} = 30 - 20 + 80 = 90$$

$$D_2 = \begin{vmatrix} 1 & 2 & -5 \\ 4 & 3 & -1 \\ 4 & -2 & 0 \end{vmatrix} \begin{matrix} 1 & 2 \\ 4 & 3 \\ 4 & -2 \end{matrix} = -8 + 40 + 60 - 2 = 90$$