

# BİÇİMSEL DİLLER VE OTOMATA TEORİSİ

## Ödev-1

### ÖDEV - 1

1.1.1 Determine whether each of the following is true or false

- (a)  $\emptyset \subseteq \emptyset$  true
- (b)  $\emptyset \in \emptyset$  false
- (c)  $\emptyset \in \{\emptyset\}$  true
- (d)  $\emptyset \subseteq \{\emptyset\}$  true
- (e)  $\{a, b\} \in \{a, b, c, \{a, b\}\}$  true
- (f)  $\{a, b\} \subseteq \{a, b, \{a, b\}\}$  true
- (g)  $\{a, b\} \subseteq 2^{\{a, b, \{a, b\}\}}$  false
- (h)  $\{\{a, b\}\} \in 2^{\{a, b, \{a, b\}\}}$  true
- (i)  $\{a, b, \{a, b\}\} - \{a, b\} = \{a, b\}$  false

1.1.2 What are these sets? Write them using braces, commas, and numerals only.

- (a)  $(\{1, 3, 5\} \cup \{3, 1\}) \cap \{3, 5, 7\}$   $\{3, 5\}$
- (b)  $\bigcup \{\{3\}, \{3, 5\}, \bigcap \{\{5, 7\}, \{7, 9\}\}\}$   $\{3, 5, 7\}$
- (c)  $(\{1, 2, 5\} - \{5, 7, 9\}) \cup (\{5, 7, 9\} - \{1, 2, 5\})$   $\{1, 2, 7, 9\}$
- (d)  $2^{\{7, 8, 9\}} - 2^{\{7, 9\}}$   $\{\{8\}, \{7, 8\}, \{8, 9\}, \{7, 8, 9\}\}$
- (e)  $2^{\emptyset}$   $\{\emptyset\}$

1.1.3 Prove each of the following.

- (a)  $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$  Dağılım özelliği
- (b)  $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$
- (c)  $A \cap (A \cup B) = A$
- (d)  $A \cup (A \cap B) = A$
- (e)  $A - (B \cap C) = (A - B) \cup (A - C)$

1.1.4 Let  $S = \{a, b, c, d\}$

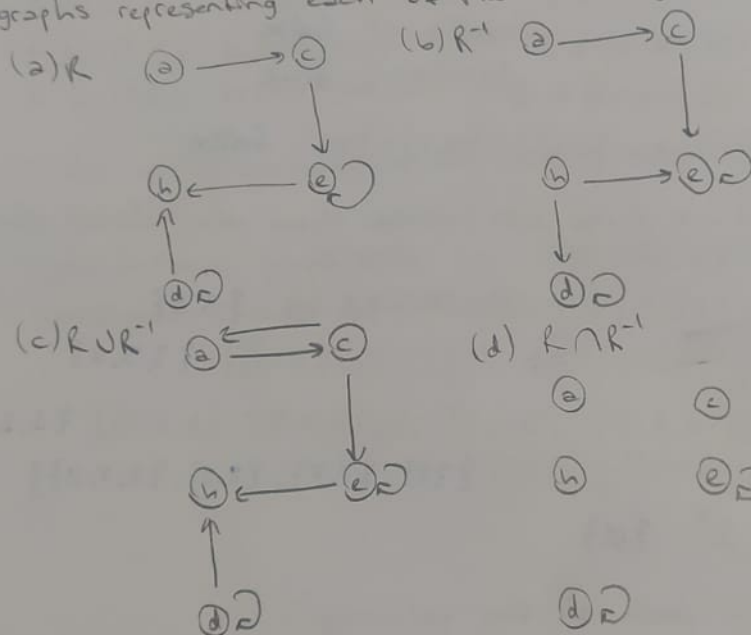
(a) What partition of  $S$  has the fewest members?  
The most members?

En az  $\{\{a, b, c, d\}\}$  En çok  $\{\{a\}, \{b\}, \{c\}, \{d\}\}$

(b) List all partitions of  $S$  with exactly two members.

$\{\emptyset, \{a, b, c, d\}\}$   $\{\{d\}, \{a, b, c\}\}$   $\{\{a\}, \{b, c, d\}\}$   $\{\{a, b\}, \{c, d\}\}$   
 $\{\{b\}, \{a, c, d\}\}$   $\{\{a, c\}, \{b, d\}\}$   $\{\{c\}, \{a, b, d\}\}$   $\{\{a, d\}, \{b, c\}\}$

1.3.1 Let  $R = \{(a, c), (c, c), (c, e), (e, b), (d, b), (d, d)\}$  Draw directed graphs representing each of the following.



1.3.2 Let  $R$  and  $S$  be the binary relations on  $A = \{1, \dots, 7\}$  with the graphical representations shown in next page.

(a) Indicate whether each  $R$  and  $S$  is (i) symmetric, (ii) reflexive and (iii) transitive  
 $R \Rightarrow$  reflexive, transitive, symmetric degildir.

$S \Rightarrow$  reflexive, transitive degildir.  
 symmetric dir.

(b) Repeat (a) for the relations  $R \cup S$   
 $R \cup S \Rightarrow$  reflexive dir.

1.3.6 Let  $A$  be a nonempty set and let  $R \subseteq A \times A$  be the empty set. Which properties does  $R$  have?

(a) Reflexivity  $\Rightarrow$  Reflexive'dir.

(b) Symmetry  $\Rightarrow$  Symmetric'dir.

(c) Antisymmetry  $\Rightarrow$  Antisymmetric'dir.

(d) Transitivity  $\Rightarrow$  Transitive'dir.

1.3.7 Let  $R_1$  and  $R_2$  be any two partial orders on the same set  $A$ . Show that  $R_1 \cap R_2$  is a partial order.

\*  $R_1 \cap R_2$  reflexive'dir.

\*  $R_1 \cap R_2$  antisymmetric'dir.

\*  $R_1 \cap R_2$  transitive'dir

1.3.9 Under what circumstances does a directed graph represent a function?

Yönlendirilmiş graphlarda her düğümeden çıkan edge bir fonksiyonu ifade etmektedir.

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