Mata Kuliah : Matematika Diskrit I
Kode Mata Kuliah : KKTI4143
Jumlah SKS : 3 SKS
Nama Dosen : Suprihanto
Minggu ke : 11
Tanggal : 24 November 2015
Jadwal : Selasa (07.00 – 08.40)

# Latihan Soal 1

Latihan soal berkaitan dengan bab himpunan

## Exercises

1. Let $A$ be the set of students who live within one mile of school and let $B$ be the set of students who walk to classes. Describe the students in each of these sets.
   a) $A \cap B$
   b) $A \cup B$
   c) $A - B$
   d) $B - A$
2. Suppose that $A$ is the set of sophomores at your school and $B$ is the set of students in discrete mathematics at your school. Express each of these sets in terms of $A$ and $B$.
   a) the set of sophomores taking discrete mathematics in your school
   b) the set of sophomores at your school who are not taking discrete mathematics
   c) the set of students at your school who either are sophomores or are taking discrete mathematics
   d) the set of students at your school who either are not sophomores or are not taking discrete mathematics
3. Let $A = \{1, 2, 3, 4, 5\}$ and $B = \{0, 3, 6\}$. Find
   a) $A \cup B$.
   b) $A \cap B$.
   c) $A - B$.
   d) $B - A$.
4. Let $A = \{a, b, c, d, e\}$ and $B = \{a, b, c, d, e, f, g, h\}$. Find
   a) $A \cup B$.
   b) $A \cap B$.
   c) $A - B$.
   d) $B - A$.

In Exercises 5–10 assume that $A$ is a subset of some underlying universal set $U$.

5. Prove the complementation law in Table 1 by showing that $\overline{\overline{A}} = A$.
6. Prove the identity laws in Table 1 by showing that
   a) $A \cup \emptyset = A$.
   b) $A \cap U = A$.
7. Prove the domination laws in Table 1 by showing that
   a) $A \cup U = U$.
   b) $A \cap \emptyset = \emptyset$.
8. Prove the idempotent laws in Table 1 by showing that
   a) $A \cup A = A$.
   b) $A \cap A = A$.
9. Prove the complement laws in Table 1 by showing that
   a) $A \cup \overline{A} = U$.
   b) $A \cap \overline{A} = \emptyset$.
10. Show that
    a) $A - \emptyset = A$.
    b) $\emptyset - A = \emptyset$.
11. Let $A$ and $B$ be sets. Prove the commutative laws from Table 1 by showing that
    a) $A \cup B = B \cup A$.
    b) $A \cap B = B \cap A$.
12. Prove the first absorption law from Table 1 by showing that if $A$ and $B$ are sets, then $A \cup (A \cap B) = A$.
13. Prove the second absorption law from Table 1 by showing that if $A$ and $B$ are sets, then $A \cap (A \cup B) = A$.
14. Find the sets $A$ and $B$ if $A - B = \{1, 5, 7, 8\}$, $B - A = \{2, 10\}$, and $A \cap B = \{3, 6, 9\}$.
15. Prove the second De Morgan law in Table 1 by showing that if $A$ and $B$ are sets, then $\overline{A \cup B} = \overline{A} \cap \overline{B}$
    a) by showing each side is a subset of the other side.
    b) using a membership table.
16. Let $A$ and $B$ be sets. Show that
    a) $(A \cap B) \subseteq A$.
    b) $A \subseteq (A \cup B)$.
    c) $A - B \subseteq A$.
    d) $A \cap (B - A) = \emptyset$.
    e) $A \cup (B - A) = A \cup B$.
17. Show that if $A$, $B$, and $C$ are sets, then $\overline{A \cap B \cap C} = \overline{A} \cup \overline{B} \cup \overline{C}$
    a) by showing each side is a subset of the other side.
    b) using a membership table.
18. Let $A$, $B$, and $C$ be sets. Show that
    a) $(A \cup B) \subseteq (A \cup B \cup C)$.
    b) $(A \cap B \cap C) \subseteq (A \cap B)$.
    c) $(A - B) - C \subseteq A - C$.
    d) $(A - C) \cap (C - B) = \emptyset$.
    e) $(B - A) \cup (C - A) = (B \cup C) - A$.
19. Show that if $A$ and $B$ are sets, then
    a) $A - B = A \cap \overline{B}$.
    b) $(A \cap B) \cup (A \cap \overline{B}) = A$.
20. Show that if $A$ and $B$ are sets with $A \subseteq B$, then
    a) $A \cup B = B$.
    b) $A \cap B = A$.
21. Prove the first associative law from Table 1 by showing that if $A$, $B$, and $C$ are sets, then $A \cup (B \cup C) = (A \cup B) \cup C$.
22. Prove the second associative law from Table 1 by showing that if $A$, $B$, and $C$ are sets, then $A \cap (B \cap C) = (A \cap B) \cap C$.
23. Prove the first distributive law from Table 1 by showing that if $A$, $B$, and $C$ are sets, then $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$.
24. Let $A$, $B$, and $C$ be sets. Show that $(A - B) - C = (A - C) - (B - C)$.
25. Let $A = \{0, 2, 4, 6, 8, 10\}$, $B = \{0, 1, 2, 3, 4, 5, 6\}$, and $C = \{4, 5, 6, 7, 8, 9, 10\}$. Find
    a) $A \cap B \cap C$.
    b) $A \cup B \cup C$.
    c) $(A \cup B) \cap C$.
    d) $(A \cap B) \cup C$.
26. Draw the Venn diagrams for each of these combinations of the sets $A$, $B$, and $C$.
    a) $A \cap (B \cup C)$
    b) $\overline{A} \cap \overline{B} \cap \overline{C}$
    c) $(A - B) \cup (A - C) \cup (B - C)$
27. Draw the Venn diagrams for each of these combinations of the sets $A$, $B$, and $C$.
    a) $A \cap (B - C)$
    b) $(A \cap B) \cup (A \cap C)$
    c) $(A \cap \overline{B}) \cup (A \cap \overline{C})$
28. Draw the Venn diagrams for each of these combinations of the sets $A$, $B$, $C$, and $D$.
    a) $(A \cap B) \cup (C \cap D)$
    b) $\overline{A} \cup \overline{B} \cup \overline{C} \cup \overline{D}$
    c) $A - (B \cap C \cap D)$
29. What can you say about the sets $A$ and $B$ if we know that
    a) $A \cup B = A$?
    b) $A \cap B = A$?
    c) $A - B = A$?
    d) $A \cap B = B \cap A$?
    e) $A - B = B - A$?

Pembahasan terutama di nomor-nomor awal dari 1 sampai 11. Dasar-dasar aturan himpunan