



SECI1013: DISCRETE STRUCTURE
2021/2022 – SEMESTER 1

ASSIGNMENT 1 (Part 1)

Deadline of submission: 11th Nov. 2021

1. Let set $U = \{n \mid n \in \text{whole numbers}, 10 \leq n \leq 30\}$;
set $B = \{b \mid b \in \text{even numbers}\}$;
set $C = \{c \mid c \in \text{natural numbers}, c > 10 \text{ and } c < 30\}$;
 $B \subseteq C$;
 $C \subseteq U$.

Answer all the following questions:

- Write down all the possible proper subsets for C and find $|C|$.
- Write down all the possible proper subsets for B and find $|B|$.
- Construct a Venn diagram based on the given sets.
- Find cardinality of symmetric difference of set B and set C .

2. Let set $A = \{s, u, b\}$;
set $B = \{s, e, t\}$;
set $C = \{n, e, t\}$.

Answer all the following questions:

- Find $|P(A)|$.
- Find $A \cup B \cap C$
- Find $A \cap B \cup C$
- Find $A - B$
- Find $B \times C$

3. Which of the following statements are propositions?

State true or false.

- The discrete structure implements set theory, relations, and functions to solve computer science problems.
- In computer science, the Boolean data type defines $0 = \text{false}$ and $1 = \text{true}$.
- Let A and B be the subsets of U . $A \cup (A \cap B) = A$ can be proved by distributive, idempotent, and commutative laws.

d. $a^2 - 2a + 1 = 0$

e. $a^2 - b^2 = 0$

4. Construct a truth table for each of the following conditional statements.

a. $(p \rightarrow q) \wedge (\neg p \leftrightarrow \neg q)$

b. $(p \leftrightarrow q) \vee (\neg p \rightarrow \neg q)$

5. Given, $A = \neg p \wedge (\neg q \vee \neg r)$ and $B = p \vee (q \wedge r)$. State whether $A \equiv B$ or not.

6. Given, $A = p \wedge (p \vee q)$ and $B = p \vee (p \wedge q)$. State whether $A \equiv B$ or not.

7. Let $P(x)$, $Q(x)$, and $R(x)$ be the statements.

“ x is a student,” “ x is smart,” and “ x is shy,” respectively.

Express each of these statements using quantifiers; logical connectives; and $P(x)$, $Q(x)$, and $R(x)$, where the domain consists of all people.

a. Some students are shy.

b. All smart people are not shy.

8. Give direct proof to show a square of any negative numbers is positive.

9. Give a proof by contradiction to show if A and B are sets, then $A \cap (B \cap A') = \{\}$.