

ASSIGNMENT 1

SCSI1013 DISCRETE STRUCTURE

SEMESTER 1 2024/2025

INSTRUCTIONS TO THE STUDENTS:

- This is a group assignment (**TWO** students/group)
- Handwritten
- Zero mark for the late submission
- Submit your assignment during class session (12/11/2024)

Question 1

Let the universal set be the set Z of all integer numbers and let $A = \{x \in Z | 0 < x \leq 2\}$,

$B = \{x \in Z | 1 \leq x < 4\}$, and $C = \{x \in Z | 3 \leq x < 9\}$. Find each of the following:

- a) $A \cup B$
- b) $A \cap B$
- c) $(A \cup B) \cap C$
- d) $(A \cup B) \cap (A \cup C)$
- e) $|A \cup C|$
- f) $B - C$
- g) $A \times (A \cup B)$
- h) $P(B)$

Question 2

In the following question let

p : 2 is an even integer,

q : -3 is a negative integer

Write the following sentences in terms of p , q and logical connectives. Then, find the truth-values of the given statements:

- a) 2 is an even integer and -3 is a negative integer.
- b) 2 is not an even integer and -3 is a negative integer.
- c) If 2 is an even integer, then -3 is not a negative integer.
- d) 2 is an even integer if and only if -3 is a negative integer.

Question 3

Determine whether statement A is logically equivalent to statement B , where

$$A: (p \leftrightarrow q)$$

$$B: (p \rightarrow q) \wedge (q \rightarrow p)$$

Question 4

Using direct proof, show that if n is an even integer, n^2 is always divisible by 4.