# Tutorial 1

## Sets

# Question 1: Inclusion & Exclusion

- What is the formula for $|A \cup B \cup C|$?

a) $|A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + |A \cap B \cap C|$

b) $|A| + |B| + |C| - |A \cap B| - |A \cap C| - |B \cap C| + 3|A \cap B \cap C|$

c) $|A| + |B| + |C| - 2|A \cap B| - 2|A \cap C| - 2|B \cap C| + 3|A \cap B \cap C|$

d) $|A| + |B| + |C| - 3|A \cap B| - 3|A \cap C| - 3|B \cap C| + 3|A \cap B \cap C|$

# Question 2: Subset Relationship

Let $A = \{n \in \mathbf{Z} \mid n = 5r \text{ for some integer } r\}$

and $B = \{m \in \mathbf{Z} \mid m = 20s \text{ for some integer } s\}$.

i. Is $A \subseteq B$ ?

ii. Is $B \subseteq A$ ?

a) Both are true.

b) Both are false.

c) (i) is true while (ii) is false

d) (i) is false while (ii) is true

# Question 3: Power Set

"If $A$ and $B$ are two sets with the same power set, then $A = B$."

Is the above statement true?

a) Yes
b) No
c) Cannot be determined

Justify your answer.

# Q.4 Cartesian Product

- Consider two nonempty sets $A$ and $B$.

- Is it true that $A \times B \neq B \times A$?

  a) Yes
  b) No
  c) Cannot be determined

  Justify your answer.

# Question 5: Set Equality

Is it true that $B = C$, where

$B = \{y \in \mathbf{Z} \mid y = 18b - 2 \text{ for some integer } b\}$,

and

$C = \{z \in \mathbf{Z} \mid z = 18c + 16 \text{ for some integer } c\}$?

a) Yes
b) No
c) Cannot be determined

Justify your answer.