25 November 2023 09:39 PM

2^n = no. of members (subsets) of a set.

$\{2, 3, 6\}$

How many subsets are there

$2^n = 2^3 = 8$

Set of subsets are power set.

$\{\phi, \{2\}, \{3\}, \{6\}, \{2,3\}, \{3,6\}, \{2,6\}, \{2,3,6\}\}$

$A = \{2 \quad 3 \quad (6) \quad 10 \quad 12\}$

$B = \{4 \quad 5 \quad (6) \quad 11 \quad 13\}$

$A \cup B = \{2, 3, 4, 5, 6, 10, 11, 12, 13\}$

$A \cap B = \{6\}$

$A - B = \{2, 3, 10, 12\}$

$U = \{5, 6, 7, 8, 9\}$

$A = \{5, 6\}$

$\bar{A} = U - A = \{7, 8, 9\}$

Laws of Set operations:

(1) Laws of inclusion

$A \cup A = A$

$A \cap A = A$

(2) Commutative law

$A \cup B = B \cup A$ and $A \cap B = B \cap A$

Ex: Let $A = \{x \mid 5 < x < 10\}$

$B = \{x \mid 8 < x < 16\}$

verify commutative law:

$A = \{6, 7, 8, 9\}$

$B = \{9, 10, 11, 12, 13, 14, 15\}$

LHS: $A \cup B = \{6, 7, 8, 9, 10, 11, \ldots, 15\}$

$B \cup A = \{6, 7, 8, \ldots, 15\}$

RHS: $B \cup A = \{1, 7, 8, \ldots, 15\}$

$\therefore A \cup B = B \cup A$ (proved).

Again

LHS: $A \cap B = \{9\}$ RHS: $B \cap A = \{9\}$

$\therefore A \cap B = B \cap A$ ✓.

② Associative Law

$(A \cup B) \cup C = A \cup (B \cup C)$

and $(A \cap B) \cap C = A \cap (B \cap C)$

Ex: Let $A = \{0\}$ $B = \{1, 2\}$

$C = \{3, 4, 5\}$

LHS: $(A \cup B) \cup C = \{0, 1, 2, 3, 4, 5\}$

RHS: $A \cup (B \cup C) = \{0, 1, 2, 3, 4, 5\}$

Again $A \cap (B \cap C) = \{\} \text{ or } \phi$

$(A \cap B) \cap C = \{3 \text{ or } 9\}$ ✓

④ Distributive Law.

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

$\therefore (A \cap B) \cup (A \cap C)$

$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

Ex: $A = \{1\}$ $B = \{1, 2, 3\}$

$C = \{3, 4, 5, 6\}$

Verify distributive law.

Practice sets, { Functions & Relation
↓ Range and Domain
↓ Set.
Cartesian set / product }

Derivatives: Solve the questions

a) Partial derivatives (both first-order and second order

ex $f_1 = \frac{\partial y}{\partial x_1}$, $f_2 = \frac{\partial y}{\partial x_{12}}$

$f_{12} = \frac{\partial^2 y}{\partial x_1 \partial x_2}$ $f_{21} = \frac{\partial y}{\partial x_2 \partial x_1}$

b) Total derivatives (chain rule) (product rule) (Quotient rule)

(Quotient rule)