

Set Theory

ملاحظة!

$$(1) A \subset B \iff "x \in A \Rightarrow x \in B"$$

$$(2) A \not\subset B \iff \exists x \in A \Rightarrow x \notin B$$

$$(3) A = B \iff A \subset B \text{ and } B \subset A$$

$$(4) A \cup B = \{x \in U : x \in A \text{ or } x \in B\}$$

$$\hookrightarrow x \in (A \cup B) \iff x \in A \text{ or } x \in B$$

$$\hookrightarrow x \notin (A \cup B) \iff x \notin A \text{ and } x \notin B$$

$$(5) A \cap B = \{x \in U : x \in A \text{ and } x \in B\}$$

$$\hookrightarrow x \in (A \cap B) \iff x \in A \text{ and } x \in B$$

$$\hookrightarrow x \notin (A \cap B) \iff x \notin A \text{ or } x \notin B$$

$$(6) A^c = \{x \in U : x \notin A\}$$

$$\hookrightarrow x \in A^c \iff x \notin A$$

$$\hookrightarrow x \notin A^c \iff x \in A$$

$$(7) \{A_i : i \in I\} \Rightarrow \text{Indexed family of sets.}$$

$$\hookrightarrow (I) \rightarrow \text{index set}, (i) \rightarrow \text{index}, (A_i) \rightarrow \text{index sets}$$

ex $D_n = \{x \in \mathbb{N} : x \text{ is a multiple of } n\}$

$$D_1 = \{1, 2, 3, \dots, n, \dots\}$$

$$D_2 = \{2, 4, 6, \dots\}$$

$$D_{10} = \{10, 20, 30, \dots\}$$

$$\Rightarrow \{D_n : n \in \mathbb{N}\}$$

Small Letter \leftarrow الفئة مكونة من

$$\text{ex } B = \{A_i : i \in I = \{0, 1\}\}$$

$$A_i = \{0, 1\}$$

$$A_0 = \{0\}$$

$$A_{0.5} = \{0, 0.5\}$$

$$UB = \{0, 1\}$$

$$NB = \{0\}$$

* Note

$$* U \alpha = I_N \rightarrow \text{اتحاد المجموعات}$$

$$* \cap \alpha = \phi \rightarrow \text{تقاطع المجموعات}$$

* Demorgans Law

$$\Rightarrow (A \cup B)^c = A^c \cap B^c$$

$$\Rightarrow (A \cap B)^c = A^c \cup B^c$$

$$* (\cup_i A_i)^c = \cap_i A_i^c$$

* Distributed Law

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

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

$$* A \cap (\cap_i B_i) = \cap_i (A \cap B_i)$$