

0.1 Sets / Part 2

- The **cardinality** of a finite set A is

$$n(A) = \text{number of elements of } A$$

Ex: If $A = \{0, 1, 2\}$, then $n(A) = 3$

- The number of subsets of a finite set is $2^{n(A)}$

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

The number of subsets of A is $2^3 = 8$

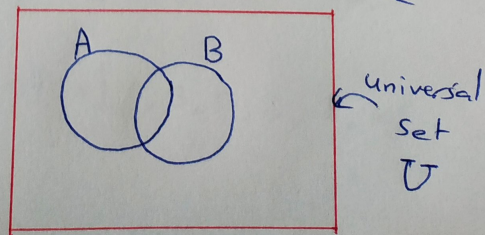
Subsets: $\{0\}, \{1\}, \{2\}, \{0, 1\}, \{0, 2\}, \{1, 2\}, \{0, 1, 2\}, \emptyset$

- **Venn diagrams:**

By assumption, each set is a subset of a larger set called **Universal set**.

This universal set is represented by a **rectangle** in Venn diagram. The subsets are represented by **circles**.

* If A and B are ^{متداخلين} **not disjoint** sets then the Venn diagram that represents them is



Sets Operations :

1) The intersection (تقاطع) of A and B is

$$A \cap B = \{x : x \in A \text{ and } x \in B\}$$

العناصر المشتركة بين المجموعتين

2) The union (اتحاد) of A and B is

$$A \cup B = \{x : x \in A \text{ or } x \in B\}$$

جميع عناصر A و B بدون تكرار

3) The complement (المتبقية) of A is

$$A' = \{x : x \in U \text{ and } x \notin A\}$$

العناصر غير الموجودة في A

4) The difference (الفرق) of A and B is

$$A - B = A \cap B'$$

Example: If $U = \{x : x \in \mathbb{N} \text{ and } x < 11\}$

$A = \{2, 4, 7, 9\}$, $B = \{x : x \text{ is a natural number less than } 6\}$

$U = \{1, 2, 3, 4, \dots, 10\}$, $B = \{1, 2, 3, 4, 5\}$

1) $A \cap B = \{2, 4\}$
intersection

2) union of A and B: $A \cup B = \{2, 4, 7, 9, 1, 3, 5\}$

3) The complement of A: $A' = \{1, 3, 5, 6, 8, 10\}$

4) The difference of A and B:

$$A - B = A \cap B'$$

$$B' = \{6, 7, 8, 9, 10\}$$

$$A = \{2, 4, 7, 9\}$$

$$A \cap B' = \{7, 9\}$$

Represent the sets by Venn diagram.

