Subsets

- A set A is called a **subset** of a set B if every element of A also belongs to B. If A is a subset of B, then we write

$$A \subseteq B$$

- We are concerned with subsets of some specified set U, called the **universal set**.

- For $a, b \in R$ and $a < b$, the **open interval** a, b is the set

$$(a, b) = \{x \in R : a < x < b\}$$

- For $a, b \in R$ and $a \leq b$, the **closed interval** a, b is the set

$$[a, b] = \{x \in R : a \leq x \leq b\}$$

- For $a < b$, we have $(a, b) \subseteq [a, b]$. For $a, b \in R$ and $a < b$, the **half-open** or **half-closed intervals** $[a, b)$ and $(a, b]$ are defined as

$$[a, b) = \{x \in R : a \leq x < b\} \quad \text{and} \quad (a, b] = \{x \in R : a < x \leq b\}$$

- For $a \in R$, the infinite intervals $(-\infty, a), (-\infty, a], (a, \infty), [a, \infty)$

- Two sets A and B are **equal**, indicated by writing $A = B$, if they have exactly the same elements.

- A set A is a **proper subset** of a set B if $A \subseteq B$ but $A \neq B$

- It is convient to represent sets as **Venn diagrams**.

- The set consisting of all subsets of a given set is called the **power set** of A and is denoted $\varphi(A)$