

Sets

Definition 1 (Set). *A set is a collection of object.*

Notation

We may define a set by listing its elements between {curly braces}.

Example: $\{2,4,6,8,10\}$

We may define a set by listing the properties its elements must satisfy, i.e. $\{x : p(x)\}$, where $p(x)$ describes the properties an element x must satisfy.

Example: $\{x : 2 \leq x \leq 10 \text{ and } x \text{ is even.}\}$

Set Inclusion: $x \in A$ means x is an element of the set A .

Operations on Sets

Definition 2 (Union). $A \cup B = \{x : x \in A \text{ or } x \in B\}$.

Definition 3 (Intersection). $A \cap B = \{x : x \in A \text{ and } x \in B\}$.

*Note that the words **and** and **or** have very different meanings.*

Definition 4 (Complement). $A^c = A' = \{x : x \notin A\}$.

This must be understood in context. We always work within some *universal set* U . By A^c , we really mean the set of elements within U which are not in A .

Definition 5 (Set Difference). $A - B = \{x \in A : x \notin B\}$.

DeMorgan's Laws

Theorem 1 (DeMorgan's Laws). $(A \cup B)^c = A^c \cap B^c$, $(A \cap B)^c = A^c \cup B^c$