Set Operations

Union: $A \cup B$: $\{x\epsilon S : x\epsilon A \text{ OR } x\epsilon B\}$
Intersection: $A \cap B$: $\{x\epsilon S : x\epsilon A \text{ AND } x\epsilon B\}$
Complement: A^c : $\{x\epsilon S : x\not\epsilon A\}$
Difference: $A - B$: $\{x\epsilon S : x\epsilon A,\ x\not\epsilon B\}$
Infinite Union: $\bigcup\limits_{i=1}^{\infty} A_i$: $\{x\epsilon S, x\epsilon A_i \ni A_i\}$
Infinite Intersection: $\bigcap\limits_{i=1}^{\infty} A_i$: $\{x\epsilon S, x\epsilon A_i \forall A_i\}$

Set Relationships

Containment: $B \subseteq A$ (A is a subset of B): $x\epsilon A$ means $x\epsilon B$
Equality: Two sets are equal if they contain each other: $A = B \therefore A \subseteq B, B \subseteq A$
Disjoint: $A \cap B = \{\}$

Set Properties

Commutativity: $A \cup B = B \cup A$, $A \cap B = B \cap A$
Associativity: $A \cup (B \cup C) = (A \cup B) \cup C$, $A \cap (B \cap C) = (A \cap B) \cap C$
Distributive: $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$, $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
DeMorgan's Law: $(A \cup B)^c = A^c \cap B^c$, $(A \cap B)^c = A^c \cup B^c$

Sigma Algebras

A collection of subsets of S is a σ-algebra ($\mathcal{B}$) iff:
a. $\emptyset \epsilon \mathcal{B}$
b. $A\epsilon\mathcal{B} \implies A^c\epsilon\mathcal{B}$
c. $A_1, A_2, ...\epsilon\mathcal{B} \implies \bigcup\limits_{n=1}^{\infty} A_n \epsilon\mathcal{B}$