**Counting Principles**

**Fundamental Counting Principle:** If event $A$ can occur in $m$ ways and after $A$ occurs event $B$ can occur in $n$ ways, then the number of ways both events $A$ and $B$ can occur is $m \times n$.

**Permutations:** The number of ways $k$ objects can be selected from $n$ objects and arranged in order is

$$nP_k = \frac{n!}{(n-k)!}$$

**Combinations:** The number of ways $k$ objects can be selected from $n$ objects without regard to order is

$$nC_k = \binom{n}{k} = \frac{n!}{k!(n-k)!}$$