Section 4.2 - *Some Terms Used in Probability*

An **experiment** is the process by which an observation is made or obtained. An **outcome** of an experiment is any result that is obtained when performing the experiment.

An **event** is a particular collection of outcomes of an experiment.

A **sample space** is a representation of all the possible outcomes of an experiment.

Fundamental Counting Principle: Multiplication Rule
The total number of possible outcomes for a compound or multi-stage experiment is the product of the number of possible outcomes for each stage of the experiment.

Section 4.3 - *Combinations*

A **combination** is a selection of objects *without* regard to order.

The number of combinations of n objects taken s at a time, symbolized as ${}_nC_s$, is:

$$ {}_nC_s = \frac{n!}{s!(n-s)!} $$

Where $n!$ is read as n "factorial" and is defined to be: $n! = n(n-1)(n-2)(n-3)\cdots 2\cdot 1$.

- Note: $0! = 1$

Section 4.4 - *Probability*

Probability is a numerical measure of the likelihood that a particular event will occur in the future. The probability of an event can only be a number from zero to one inclusive, or in terms of percent, from zero to 100% inclusive.

Classical Probability Definition for Equally Likely Outcomes
The probability of an event E, written P(Event E), is equal to the number of outcomes satisfying the event E divided by the total number of outcomes in the sample space, provided each outcome within the sample space is equally likely. This formula can be written as:

$$ P(Event\ E) = \frac{number\ of\ outcomes\ satisfying\ event\ E}{total\ number\ of\ outcomes\ in\ the\ sample\ space} $$

- The probability of an event E must always be between 0 and 1 inclusive
- The sum of the probabilities of all the outcomes in the sample space of an experiment always equals 1.