Random Variables

Random Variable
A real function that assigns a number to each outcome in a sample space.

Sample Space
The set of all possible outcomes that can be achieved with a random variable.

The random variable may be discrete or continuous .

Discrete Random Variable
Can only take on countable number values. These do not have to be whole numbers.

Example
Number of red balls in a bag
Number of children in a family
Shoe Size
Number of heads that appear when tossing a coin

Example VCAA 2002 Exam 1 Question 23
The number of goals scored by a team in a football match.

Continuous Random Variable
Can take on values that range over an interval of real values.

Example VCAA 2002 Exam 1 Question 23
The area of a park in Victoria.
The height of a child in a preschool in Victoria.
The time it takes a student to walk three kilometres to school.
The weight of a newborn baby in a hospital in Victoria.

Probability Notation
The probability that the random variable X will equal x is notated as $\Pr(X = x)$

Probability Density Function
A function that describes the relative likelihood for a random variable to take on a given value.
It must satisfy the following two conditions:

- Each probability must be between 0 and 1 inclusive $0 \leq \Pr(X = x) \leq 1$
- The total probability must add to 1 $\sum \Pr(X = x) = 1$