

Introduction to Statistics and Probability

Important Terms

- Experiment: A process leading to a well-defined observations or outcomes that generates a set of data
- Trial: Each repetition, if the experiment can be repeated any number of times under identical conditions
- Sample Space (S): The set containing all possible outcomes of an experiment
- Finite sample space: Sample space that contains a finite number of outcomes
- Continuous Sample space: Sample space that contains an interval of values

Events

- Event: A subset of the sample space. Usually denoted in capital English letters.
- Simple Event: An event that can be described by a single characteristic
- Mutually Exclusive Events: Two events A and B are said to be mutually exclusive or disjoint if $A \cap B = \emptyset$. They cannot happen together.
- Independent Events: If the occurrence of one event not affect on the occurrence of other event then both events are said to be independent with each other.
- Joint Events: An outcome from a sample space with two or more characteristic simultaneously is called a joint event. Eg:- Drawing a red ace from a deck of cards

Example

A balanced/fair die (with all outcomes equally likely) is rolled. Let A be the event that an even number occurs.

Experiment : Rolling a balanced die.

Sample Space : $S = \{1,2,3,4,5,6\}$

Event (A) : $A = \{2,4,6\}$

Type of the event: Simple event

Write down the sample space of the following experiments.

- 1) Tossing a coin
- 2) Tossing a die
- 3) Tossing two coins
- 4) Tossing two dice
- 5) Picking a number from 1-10

Probability

- What is probability ?

Probability is the measure of how likely an event or out come is.

- The notation for the statement “Probability of the event A” is denoted as **Pr(A) or P(A)**.
- The value for the probability is between 0 and 1.
- Assessing Probability

$$\text{Probability} = \frac{\text{number of favorable outcomes observed}}{\text{total number of outcomes observed}}$$

What is the probability that I will choose a red marble?

In this bag there are

- 3 red marbles
- 2 white marbles
- 1 purple marble
- 4 green marbles



Let's roll a die

What is the probability that you will get an even number ?



Suppose we toss two coins. Assume that all the outcomes are equally likely (fair coins). Let A be the event that at least one of the coins shows up heads. Find $P(A)$.

