**Probability:**

Probability is the likelihood of an event occurring. This event can anything. We measure probability with numeric values between 0 and 1, because we like to compare the relative

likelihood of events.

* Formula:

The Probability of event **X** occurring equals the **number of preferred outcomes** over the **number of outcomes** in the sample space.

* Preferred outcomes are the outcomes we want to occur or the outcomes we are interested in or Favourable.
* Sample space refers to all possible outcomes that can occur. Its “size” indicates the number of elements in it.
* If two events are independent:

The probability of them occurring simultaneously equals the product of them occurring on their own: **P(A B) = P(A) . P(B)**

**Expected Values:**

Experimental Probability – The probability we assign an event, based on an experiment we conduct.

Expected value – the specific outcome we expect to occur when we run an experiment. Trial – Observing an event occur and recording the outcome.

Experiment – A collection of one or multiple trials.

Example for Trial: Flipping a coin and recording the outcome

Example for Experiment: Flipping a coin 20 times and recording the 20 individual outcomes.

In this instance, the experimental probability for getting heads would equal the number of heads we record over the course of the 20 outcomes, over 20 (the total number of trials).

The expected value can be numerical, Boolean, categorical or other, depending on the type of the event we are interested in. For instance, the expected value of the trial would be the more likely of the two outcomes, whereas the expected value of the experiment will be the number of times we expect to get either heads or tails after the 20 trials.

Expected value for categorical variables: Expected value for numeric variables:

𝐸 (𝑋) = 𝑛 × 𝑝

**Probability Frequency Distribution:**

A collection of the probabilities for each possible outcome of an event. It helps to try and predict future events when the expected value is unattainable.

**Frequency** is the number of times a given value or outcome appears in the sample space.

The **frequency distribution table** is a table matching each distinct outcome in the sample space to its associated frequency. Its obtained by dividing every frequency by the size of the sample space.

**Complements:**

The complement of an event is everything an event is not. And denoted the complement of an event with an apostrophe.

Characteristics of complements:

• Can never occur simultaneously.

• Add up to the sample space. (A + A’ = Sample space)

• Their probabilities add up to 1. (P(A) + P(A’) = 1)

• The complement of a complement is the original event. ((A’)’ = A)