1 Probability

Probability of an event is the number of results over the total number of possible results.

$$P(E) = \frac{Number\ of\ outcomes}{Total\ number\ of\ possible} \tag{1}$$

e.g If you throw a dice twice what are the chances (probability) of 1 side being shown.

$P(E) = \frac{2}{6} = \frac{1}{3}$

This often described as a 1 in 3 chance of occurring.

1.1 Probability Arithmetic

Rule of thumb in combining probability is if you have two events, and you want to know the probability of

- Probability of Event A **AND** Event B = $P(A) * P(B)$
- Probability of Event A **OR** Event B = $P(A) + P(B)$
- Probability of an Event E **NOT** occurring $P(NOTE) = P(\overline{E}) = 1 - P(E)$

e.g If you throw two dice (Dice A and Dice B) at the same time, what are the chances (probability) of the number 6 been shown on (1) both the dice A AND dice B, (2) Probability or either dice A OR dice B being the number 6 and (3) chances of the number 6 NOT landing on both dice A AND dice B.

(1)

$P(A\ AND\ B) = P(A) * P(B)$
$P(A\ AND\ B) = \frac{1}{6} * \frac{1}{6}$
$P(A\ AND\ B) = \frac{1*1}{6*6} = \frac{1}{36}$

(2)

$P(A\ OR\ B) = P(A) + P(B)$
$P(A\ OR\ B) = \frac{1}{6} + \frac{1}{6}$
$P(A\ OR\ B) = \frac{1+1}{6} = \frac{2}{6} = \frac{1}{3}$

(3)

$NOT\ (P(A\ AND\ B)) = 1 - (P(A) * P(B))$
$NOT\ P(A\ AND\ B) = 1 - (\frac{1}{6} * \frac{1}{6})$
$NOT\ P(A\ AND\ B) = 1 - (\frac{1*1}{6*6}) = 1 - (\frac{1}{36}) = \frac{36-35}{36} = \frac{35}{36}$

2 Sets

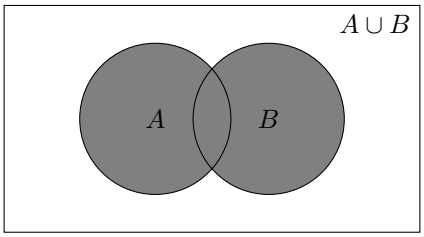
A Set is a collection of objects, in mathematics it is generally a collection of numbers but could be other objects.

- **Union** A Union B is all the contents of sets A and B. $A \cup B$
- **Intersection** A intersection B is the contents which are common to A and B. $A \cap B$
- **NOT** A NOT B is contents of set A which is not in set B. $A - B$

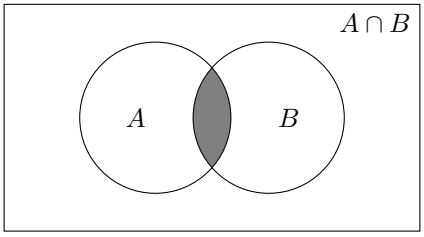
2.1 Venn Diagram

Sets can be represented diagramatically using Venn Diagrams.

A Union B



A Intersection B



A Intersection B NOT C