MUTUALLY EXCLUSIVE EVENTS

MUTUALLY EXCLUSIVE EVENTS are events that cannot occur at the same time. Mutually exclusive events are events that have no outcome in common, for mutually exclusive events, it is impossible that they can happen at the same time. Very often you will read the word “or” to indicate that the events are mutually exclusive. Mutually exclusive events are called Disjoint events, the probability of both events occurring at the same time will be Zero

If A and B are the two events, then the probability of mutually exclusive or disjoint of event A and B is written as:

Probability of Disjoint (or) mutually exclusive events =P (A and B) =0

The probability of a mutually exclusive event is the probability that only 1 of the events will occur. For example, heads and tails are mutually exclusive when flipping a coin. If you flip a coin, it can only be head or tails, never both at the same time.

HOW TO FIND MUTUALLY EXCLUSIVE EVENTS

In probability, the specific addition rule is valid when two events are mutually exclusive, it is the sum of probability of each event occurring. If A or B are said to be mutually Exclusive then the probability of an event A occurring or the probability of event B occurring is:

P (A u B) formula is given by P(A) + P(B) i.e

P (A or B) = P(A) +P(B)

P (A u B) = P(A) + P(B)

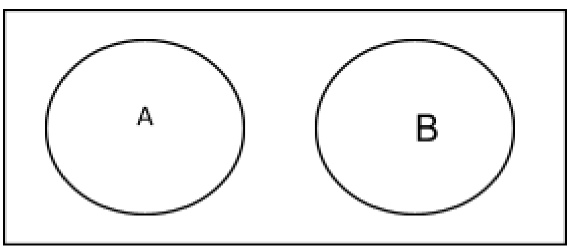
Note:

If the events A and B are not mutually exclusive, the probability of getting A or B i.e P (A u B) the formula is given as

P (A u B) = P(A) + P(B) – P (A and B)

It is important in probability Mathematics to be able to recognize Mutually Exclusive Events since they have properties that allow us to work out the likelihood of these events happening.

For example, you cannot have a scenario where it is both Monday and Friday, or you cannot select a diamond and a black card in one pick from a deck at the same time.



The Venn diagram shows very clearly that, to be mutually Exclusive, events A and B needs to be separate. Indeed there is clearly no overlap between the two events

Example 1:

You roll a regular 6 – sided dice. What is the probability of rolling an even number?

Solution

P(rolling an even number) = P(rolling 2) + P(rolling 4) + P(rolling 6)
= 1/6 + 1/6 + 1/6 = 1/2

Example 2:

A couple has two children. What is the probability that at least one child is a boy?

Solution

P(at least one child is a boy) = 1 – 1/4
= 3/4

Example 3:

The likelihood of the 3 teams A, B , C winning a football match are ⅓, ⅕ and 1/9 respectively. Find the probability that;

(a) Out of the three teams either team A or team B will win.

(b) Either team A or team B or team C will win

(c) None of the teams will win the match .

Solution:

(a) P(A or B will win) = P(A) + P(B)

= ⅓ + ⅕ = (5+3)/ 15
= 8/15

(b) P(A or B or C will win) = P(A) + P(B) + P(C)

= $\frac{1}{3}$ + $\frac{1}{5}$ + 1/9

= (15 + 9 + 5)/ 45

= 29/45

(c) P(none will win)

= 1 - P(A or B or C will win)

= 1 - 29/45

= (45/45) - (29/45)

= 16/45