Classical Defination of Probability

E ← event

S ← sample space.

$$P(E) = \frac{\text{Number of favourable outcomes}}{\text{Total no. of outcomes}}$$

$$P(E) = \frac{n(E)}{n(S)}$$

P(E) → Probability of occurrence / happening of event E

Axioms of Probability

(1) $0 \leq P(E) \leq 1$

(2) $P(S) = 1$

(3) $E_1, E_2, \ldots, E_n$ be n- multually exclusive events then

$$P(E_1) + P(E_2) + \ldots + P(E_n) = P(E_1) + P(E_2) + \ldots + P(E_n)$$

Q. Three coins are tossed. Find the probability of getting

(a) exactly one head
(b) atleast two heads
(c) atmost two heads
(d) no heads.

Soln: Here, $S = \{HHH, HHT, HTH, THH, THT, HTT, TTH, TTT\}$

$n(S) = 8$

Two coins

HH, HT, TH, TT

(a) Let E_1 = getting exactly one head. $= \{HTT, TTH, THT\}$

$n(E_1) = 3$

∴ Probability of getting exactly one head, $P(E_1) = \frac{n(E_1)}{n(S)} = \frac{3}{8}$

(b) E_2 = getting atleast two heads

$= \{HHH, HHT, HTH, THH\}$

$\therefore P(E_2) = \frac{4}{8} = \frac{1}{2}$

(c) E_3 = getting atmost 2 heads.

$= \{HHT, HTH, THH, THT, HTT, TTH, TTT\}$

$\therefore P(E_3) = \frac{7}{8}$

(d) E_4 = getting no head = $\{TTT\}$

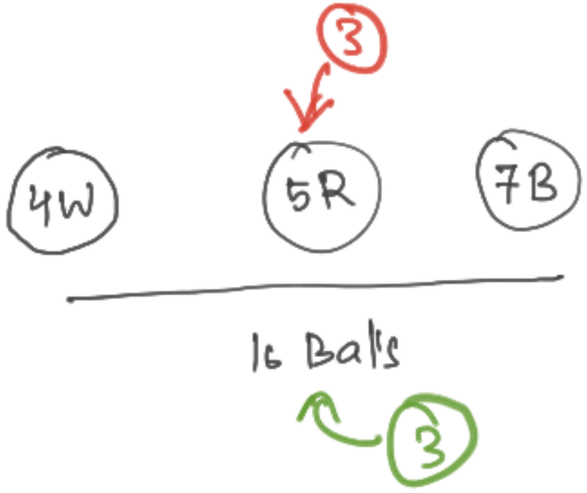
$\therefore P(E_4) = \frac{1}{8}$

Q. A bag contains 4 white, 5 red and 7 black balls

(a) what is the probability that three ball's drawn at random are all red balls?

(b) what is the probability that one is white, one is red

and one is black ball?



Sol:

Total no. of balls = 16

Total no. of white balls = 4

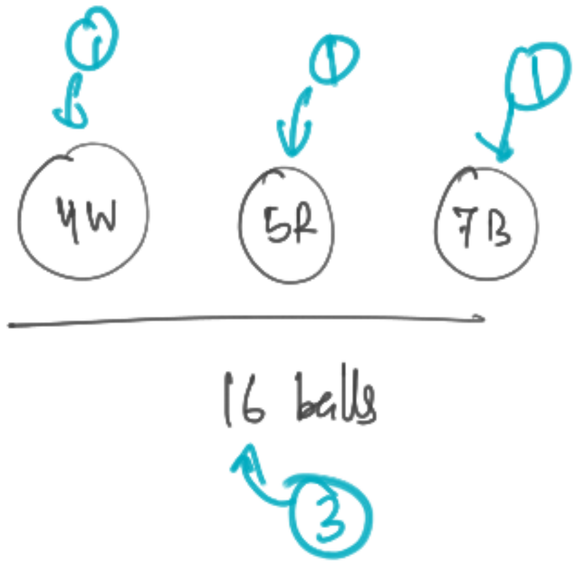
" " " red " = 5

" " " black " = 7

(a) Probability of getting 3 red balls $= \frac{{}^{5}C_{3}}{{}^{16}C_{3}} = ?$

(b) Probability of getting 1 white, 1 red, 1 black ball

$$= \frac{{}^{4}C_{1} \times {}^{5}C_{1} \times {}^{7}C_{1}}{{}^{16}C_{3}} = ?$$



Q. What is the probability that a non-leap year contains 53 sundays?