Problems based on Probability definition:-

problems set-1

Find the probability of getting one red King if we select a card from a pack of 52 cards.

Sol:- No. of possible case $= {}^{2}C_1$

No. of exhaustive case $= {}^{52}C_1$

$$\text{Required probability} = \frac{\text{No. of possible cases}}{\text{No. of exhaustive cases}}$$

$$= \frac{{}^{2}C_1}{{}^{52}C_1} = \frac{2}{52} = \frac{1}{26}$$

Find the probability of getting one head on a tossing two coins:

Let Sample space $S = \{HH, HT, TH, TT\}$

$n(S) = 4$

Let A = event of getting one head

$= \{HT, TH\}$

$n(A) = 2$

Required probability $= \frac{n(A)}{n(S)} = \frac{2}{4} = \frac{1}{2}$

Find the probability of getting a head in tossing coin

If three coins are tossed. Find the probability of getting (i) three heads
(ii) Two heads
(iii) one head
(iv) no head.

Three cards are drawn from a pack of 52 cards. Find the probability that
(i) 3 are spades
(ii) 2 are spades, one diamond
(iii) 1 spade, 1 diamond, 1 heart

Solution:-

No. of exhaustive cases $= {}^{52}C_3 = 22100$

(i) Find the probability of getting 3 Spades

No. of favourable cases $= {}^{13}C_3 = 286$

Required prob^{n} $= \frac{286}{22100}$

(ii) Find the probability of getting
2 spades 1 diamond

$\therefore$ No. of favourable cases $= {}^{13}C_2 \cdot {}^{13}C_1$

Required Probability $= \frac{{}^{13}C_2 \cdot {}^{13}C_1}{{}^{52}C_3}$

$= \frac{1014}{22100}$

(iii) Find the probability of getting
1 spade, 1 diamond, 1 heart

No. of favourable cases $= {}^{13}C_1 \cdot {}^{13}C_1 \cdot {}^{13}C_1$

Required probability $= \frac{{}^{13}C_1 \cdot {}^{13}C_1 \cdot {}^{13}C_1}{{}^{52}C_3} = \frac{2197}{22100}$

Four cards are drawn at random from a pack of 52 cards. Find the probability that

(i) They are a king, a queen, a jack, an ace

(ii) Two are kings and two are aces

(iii) All are diamonds

(iv) Two are red and two are black

(v) There is one card of each suit.

(vi) There are two cards of clubs and two cards diamonds

Hint :-

(i) $\frac{{}^4C_1 \; {}^4C_1 \; {}^4C_1 \; {}^4C_1}{{}^{52}C_4}$

(ii) $\frac{{}^4C_2 \cdot {}^4C_2}{{}^{52}C_4}$

(iii) $\frac{{}^{13}C_4}{{}^{52}C_4}$

(iv) $\frac{{}^{26}C_2 \cdot {}^{26}C_2}{{}^{52}C_4}$

(v) $\frac{^{13}C_1 \; ^{13}C_1 \; ^{13}C_1 \; ^{13}C_1}{^{52}C_4}$

(vi) $\frac{^{13}C_2 \cdot \; ^{13}C_2}{^{52}C_4}$

What is the probability for a leap year to have 52 mondays and 53 Sundays

Sol:- A leap year has 366 days
i.e 52 weeks and 2 days
These two days can be any one of the following 7 days

(i) Mon & Tues
(ii) Tues & Wed
(iii) Wed & Thurs
(iv) Thurs & Fri
(v) Fri & Sat
(vi) Sat & Sun
(vii) Sun & Mon

Let E be the event of having 52 mondays and 53 Sundays in the year
Total of no. of possible cases $= n = 7$

No. of favourable case $= m = 1$
(Sat & Sun is the only favourable case)

$$P(E) = \frac{m}{n} = \frac{1}{7}.$$

What is the chance that a non-leap year should have fifty three Sundays?

Sol:- A non-leap year has 365 days
i.e 52 weeks and 1 days

A non-leap year will consist of 53 Sundays if this over day is Sunday.

This over day can be any one of the possible outcomes
(i) Sunday
(ii) monday
(iii) Tuesday
(iv) wednesday
(v) Thursday
(vi) Friday
(vii) Saturday
i.e 7 outcomes in all

Of these, the number of ways favourable to the required event, the over-day being Sunday is 1,

Required probability $= \frac{1}{7}$.

A uniform die is thrown at random. Find the probability that the number on it is
(i) even
(ii) odd
(iii) even or multiple of 3
(iv) even and multiple of 3
(v) greater than 4.

Sol:- Sample space $S = \{1, 2, 3, 4, 5, 6\}$

$n(S) = 6$

(i) let A = event of getting even number

$= \{2, 4, 6\}$

$n(A) = 3$

Required probability $= \frac{n(A)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

(ii) let A = event of getting odd numbers

$= \{1, 3, 5\}$

$n(A) = 3$

Required probb^{ll} $= \frac{n(A)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

(iii) let A = event of getting even or multiple of 3

$= \{2, 3, 4, 6\}$

$n(A) = 4$

Required probb^{ll} $= \frac{n(A)}{n(S)} = \frac{4}{6} = \frac{2}{3}$

(iv) Let A = event of getting even and multiple of 3

$= \{6\}$

$n(A) = 1$

$$P(A) = \frac{n(A)}{n(S)} = \frac{1}{6}$$

(v) Let A = event of getting greater than 4

$= \{5, 6\}$

$n(A) = 2$

$$P(A) = \frac{n(A)}{n(S)} = \frac{2}{6} = \frac{1}{3}$$