

2013. Probability

2. \rightarrow Find the probability of drawing 2 aces in succession from a pack of 52 cards.

Soln The probability of drawing an ace on the first trial is $\frac{4}{52}$

$$\text{OR } P(A) = \frac{4}{52}$$

When one ace has been taken, the probability of drawing 2nd ace on the 2nd trial is $\frac{3}{51}$ OR $P\left(\frac{B}{A}\right) = \frac{3}{51}$

\therefore req^d probability,

$$P(AB) = P(A) \cdot P\left(\frac{B}{A}\right)$$

$$= \frac{4}{52} \cdot \frac{3}{51}$$

$$= \frac{1}{13} \cdot \frac{1}{17}$$

$$P(AB) = \frac{1}{221}$$

2
13
17
91
13
221

Page no 888

* ex 2 Calculate the probability of drawing a white and a black ball in succession from an urn containing 30 black balls and 20 white balls.

Ans: no of total white balls = 20
no of total black balls = 30

∴ Event of drawing white ball = A
" " " " black ball = B

∴ Probability of drawing a white ball, $P(A) = \frac{20}{50}$
after a white ball is drawn,

the probability of drawing black ball $P\left(\frac{B}{A}\right) = \frac{30}{49}$

$$\begin{aligned} \therefore P(AB) &= P(A) \cdot P\left(\frac{B}{A}\right) \\ &= \frac{20}{50} \cdot \frac{30}{49} \end{aligned}$$

$$P(AB) = \frac{12}{49} //$$

Q10

2. \Rightarrow Find the expected no of heads when n coins are tossed?

\Rightarrow Let, Random variable X shows the no of heads, such that $X_i = 1$, if i th coin shows head, $X_i = 0$, if i th coin shows tail.

So, for any i th coin

$$E(X_i) = \frac{1}{2} \cdot 1 + \frac{1}{2} \cdot 0 = \frac{1}{2}$$

\because Prob. of getting head = $\frac{1}{2}$
getting tail = $\frac{1}{2}$

The total no of heads is,

$$m = X_1 + X_2 + X_3 + \dots + X_n$$

\therefore expectation of getting head is given by

$$\begin{aligned} E(m) &= E(X_1 + X_2 + \dots + X_n) \\ &= E(X_1) + E(X_2) + \dots + E(X_n) \end{aligned}$$

$$= \frac{1}{2} + \frac{1}{2} + \dots + \frac{1}{2}$$

$$E(m) = \frac{n}{2} //$$

4. c) ii) Write a short note on Gaussian distribution.

⇒ The most important probability distribution which arises as a limit of the binomial distribution is known as Normal distribution or Gaussian distribution. It is a continuous distribution. Its probability function is given by the equation

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\frac{x^2}{2\sigma^2}} \quad \text{where,}$$

$$\sigma = X - \eta p$$

$$= X - M$$

Here, M is the arithmetic mean

$\sigma = \sqrt{npq}$ is the standard deviation of Gaussian distribution.

It states that, the average samples of observations of random variable drawn from independent distribution, become normally

distributed when the number of observation is sufficiently large. Gaussian distribution are important in statistics and are often used in the natural & social sciences to represent real valued random variable whose distributions are not known.

