DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :8

Topic :-PROBABILITY

1 **(a)**

Given, one integer is chosen at random from the first 200 positive integers and integer chosen is divisible by 6 or 8.

$\therefore$ One integer can be chosen out of 200 integers in ${}^{200}C_1$ ways.

Let A be the event that an integer selected is divisible by 6 and B that it is divisible by 8.

Then, $P(A) = \frac{33}{200}, P(B) = \frac{25}{200}$

and $P(A \cap B) = \frac{8}{200}$

$\therefore P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= \frac{33}{200} + \frac{25}{200} - \frac{8}{200} = \frac{1}{4}$

2 **(c)**

Given that, $E(X) = 3$ and $E(X^2) = 11$

Variance of $X = E(X^2) - [E(X)]^2$

$= 11 - (3)^2 = 11 - 9 = 2$

3 **(b)**

Let X be the number of heads getting in n tossed. Therefore, X follows binomial distribution with parameters

$n, P = \frac{1}{2}, q = \frac{1}{2}$

Since, $P(X \geq 1) \geq 0.8$ [given]

$\therefore 1 - P(X = 0) \geq 0.8$

$\Rightarrow P(X = 0) \leq 0.2$

$\Rightarrow {}^nC_0 \left(\frac{1}{2}\right)^0 \left(\frac{1}{2}\right)^n \leq 0.2$

$\Rightarrow \frac{1}{2^n} \leq \frac{1}{5} \Rightarrow 2^n \geq 5$

Hence, least value of n is 3

4 **(c)**

Total number of digits in any number at the unit place is 10.

$\therefore\ n(S) = 10$

To get the last digit in product is 1, 3, 5 or 7, it is necessary the last digit in each number must be 1, 3, 5 or 7.

$n(A) = 4,$

$\therefore\ P(A) = \frac{4}{10} = \frac{2}{5}$

Hence, required probability $= \left(\frac{2}{5}\right)^4 = \frac{16}{625}$

5 **(a)**

Since, events are independent, so

$P(A \cap B') = P(A) \times P(B') = \frac{3}{25}$

$\Rightarrow P(A) \times [(1 - P(B)] = \frac{3}{25}$ ...(i)

Similarly, $P(B) \times [1 - P(A)] = \frac{8}{25}$ ...(ii)

$\therefore$ From Eqs.(i) and (ii), $P(A) = \frac{1}{5}$

6 **(a)**

We have,

$x^2 - 3x + 2 \geq 0 \Rightarrow (x-1)(x-2) \geq 0 \Rightarrow x < 1$ or $x > 2$

$\therefore$ Required probability $= \frac{\int_0^1 dx + \int_2^5 dx}{\int_0^5 dx} = \frac{4}{5}$

7 **(d)**

P(At least on head) $= 1 - P$(zero head)

$= 1 - P$(all three tails)

$= 1 - \frac{1}{8} = \frac{7}{8}$

8 **(b)**

For binomial distribution

0<variance<mean

$\Rightarrow 0 < \beta < \alpha$

9 **(c)**

Given, $x^2 - n = 0$

$\Rightarrow x = \pm\sqrt{n}$

$\therefore\ n = 1, 4, 9, 16, 25, 36$

$\therefore$ Required probability $=\frac{6}{40}=\frac{3}{20}$

10 **(b)**

In a pack of 52 cards, there are 26 black cards.

$\therefore$ Required probability $=\frac{^{26}C_3}{^{52}C_3}$

$=\frac{26\times25\times24}{3\times2\times1}\times\frac{3\times2\times1}{52\times51\times50}$

$=\frac{2}{17}$

11 **(d)**

We have,

Total number of elementary events $=6^3=216$

Exactly two of three dice will show the same number in

$^6C_1\times\ ^5C_1\times\frac{3\,!}{2\,!}$ ways

$\therefore$ Favourable number of elementary events

$=\ ^6C_1\times\ ^5C_1\times\frac{3\,!}{2\,!}=90$

Hence, required probability $=\frac{90}{216}$

12 **(c)**

Since, $P(B)=\frac{2}{7}$ and $P(A\cup B^c)=0.8$

$P(B^c)=1-\frac{2}{7}=\frac{5}{7}$

Using, $P(A\cup B^c)=P(A)+P(B^c)-P(A).P(B^c)$

$\Rightarrow 0.8=P(A)+\frac{5}{7}-\frac{5}{7}P(A)$

$\Rightarrow 0.8=\frac{5}{7}+\frac{2}{7}P(A)$

$\Rightarrow P(A)=0.3$

13 **(d)**

Clearly, $P(A\cup B\cup C)=1$

$\Rightarrow P(A)+P(B)+P(C)=1$

$\Rightarrow P(A)+\frac{1}{2}P(A)+\frac{1}{3}P(A)=1$

$\Rightarrow \frac{11}{6}P(A)=1$

$\Rightarrow P(A)=\frac{6}{11}$

14 **(d)**

$P(X=0)=k, P(X=1)2k\left(\frac{1}{5}\right)^1$

$P(X=2)=3k\left(\frac{1}{5}\right)^2,...$

Since, $P(X=0)+P(X=1)+P(X=2)+...=1$

$\therefore k+2k\left(\frac{1}{5}\right)+3k\left(\frac{1}{5}\right)^2+...=1$

and $+\frac{k}{5}+2k\left(\frac{1}{5}\right)^2+...=\frac{1}{5}$

$-\quad-\quad-\quad-\quad-$

$k+k\left(\frac{1}{5}\right)+k\left(\frac{1}{5}\right)^2+...=\frac{4}{5}$

$\Rightarrow \frac{k}{1-\frac{1}{5}}=\frac{4}{5}$

$\Rightarrow k=\frac{16}{25}$

$\therefore P(X=0)=\frac{16}{25}(0+1)\left(\frac{1}{5}\right)^0=\frac{16}{25}$

15 **(c)**

Given, $P(\overline{B})=\frac{1}{3}\Rightarrow P(B)=\frac{2}{3}$,

$P(A\cup B)=\frac{5}{6}, P(A\cap B)=\frac{1}{3}$

Now, $P(A\cup B)=P(A)+P(B)-P(A\cap B)$

$\Rightarrow \frac{5}{6}=P(A)+\frac{2}{3}-\frac{1}{3}$

$\Rightarrow P(A)=\frac{5}{6}-\frac{2}{3}+\frac{1}{3}=\frac{1}{2}$

16 **(c)**

We have,

Total number of ways of selecting 4 tickets $= 3^4 = 81$

Favourable number of ways

$=$ Sum of the coefficients of $x^2, x^4, \ldots$ in $(x + x^2 + x^3)^4$

$=$ Sum of the coefficients of $x^2, x^4, \ldots$ in $x^4(1 + x + x^2)^4$

Let $(1 + x + x^2)^4 = 1 + a_1 x + a_2 x^2 + \ldots + a_8 x^8$

Putting $x = 1$ and $x = -1$ respectively, we get

$3^4 = 1 + a_1 + a_2 + a_3 + \ldots + a_8$

and, $1 = 1 - a_1 + a_2 - a_3 + \ldots + a_8$

$\therefore 3^4 + 1 = 2(1 + a_2 + a_4 + a_6 + a_8)$

$\Rightarrow a_2 + a_4 + a_6 + a_8 = 40$

Thus, the sum of the coefficients of $x^2, x^4, \ldots = 40$

Hence, required probability $= \frac{40}{81}$

17 **(c)**

Probability of getting a white ball at any draw is, p

$= \frac{12}{24} = \frac{1}{2}$.

The probability of getting a white ball 4th in the 7th draw

$= P$ (getting 3 white balls in 6 draws) $\times P$ (white ball at the 7th draw)

$$= {}^6C_3\left(\frac{1}{2}\right)^6 \cdot \frac{1}{2} = \frac{20}{2^7} = \frac{5}{32}$$

18 **(c)**

Total number of persons $= 15$

and number of persons who can speak Hindi and English both

$= 10 + 8 - 15 = 3$

$\therefore$ Required probability $= \frac{{}^7C_1 \times {}^3C_1}{{}^{15}C_2} = \frac{7 \times 3}{\frac{15 \times 14}{2}} = \frac{1}{5}$

19 **(b)**

Required probability $= \frac{1}{2}\left(\frac{{}^3C_1}{{}^7C_1} + \frac{{}^2C_1}{{}^8C_1}\right)$

$$= \frac{1}{2}\left(\frac{3}{7} + \frac{2}{8}\right) = \frac{19}{56}$$

20 **(c)**

Favourable cases will be (5,1),(4,2),(2,4),(1,5)

Hence, required probability $= \frac{4}{6.5} = \frac{2}{15}$

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	A	C	B	C	A	A	D	B	C	B
Q.	11	12	13	14	15	16	17	18	19	20
A.	D	C	D	D	C	C	C	C	B	C