DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP NO. :1

Topic :-PROBABILITY

1 **(a)**

Since the given distribution is a probability distribution

$\therefore 0+2p+2p+3p+p^2+2p^2+7p^2+2p=1$

$\Rightarrow 10p^2+9p-1=0 \Rightarrow (10p-1)(p+1)=0 \Rightarrow p=1/10$

2 **(a)**

We have,

$P(E\cap F)=\frac{1}{12}$ and $P(\bar{E}\cap\bar{F})=\frac{1}{2}$

$\Rightarrow P(E)P(F)=\frac{1}{12}$ and $P(\bar{E})P(\bar{F})=\frac{1}{2}$

[$\because E$ and F are independent events]

$\Rightarrow P(E)P(F)=\frac{1}{12}$ and $\{1-P(E)\}\{1-P(F)\}=\frac{1}{2}$

$\Rightarrow P(E)P(F)=\frac{1}{12}$ and $1-\{P(E)+P(F)\}+P(E)P(F)=\frac{1}{2}$

$\Rightarrow P(E)P(F)=\frac{1}{12}$ and $1-\{P(E)+P(F)\}+\frac{1}{12}=\frac{1}{2}$

$\Rightarrow P(E)P(F)=\frac{1}{12}$ and $P(E)+P(F)=\frac{7}{12}$

The quadratic equation having $P(E)$ and $P(F)$ as its roots is

$x^2-\{P(E)+P(F)\}x+P(E)P(F)=0$

$\Rightarrow x^2-\frac{7}{12}x+\frac{1}{12}=0 \Rightarrow x=\frac{1}{3},\frac{1}{4}$

$\therefore P(E)=\frac{1}{3}$ and $P(F)=\frac{1}{4}$ or, $P(E)=\frac{1}{4}$ and $P(F)=\frac{1}{3}$

3 **(a)**

We have,

$p=$ Probability of getting at least 3 in a throw $=\frac{4}{6}=\frac{2}{3}$

$\therefore q=1-p=\frac{1}{3}$

Required probability

$={}^6C_3\left(\frac{2}{3}\right)^3\left(\frac{1}{3}\right)^3+{}^6C_4\left(\frac{2}{3}\right)^4\left(\frac{1}{3}\right)^2+{}^6C_5\left(\frac{2}{3}\right)^5\left(\frac{1}{3}\right)+{}^6C_6\left(\frac{2}{3}\right)^6$

$= 41 \times \dfrac{2^4}{3^6}$

4 **(c)**

Given $P(A \cup B) = 0.6, P(A \cap B) = 0.3$

$\therefore\ P(A') + P(B')$

$= 1 - P(A) + 1 - P(B) = 2 - \{P(A) + P(B)\}$

$= 2 - \{P(A \cup B) + P(A \cap B)\}$

$= 2 - \{0.6 + 0.3\} = 2 - 0.9 = 1.1$

6 **(c)**

Given, $P(A) = \frac{1}{3}, P(B) = \frac{1}{3}$ and $P(C) = \frac{1}{4}$

$\therefore P(A') = \dfrac{2}{3}, P(B') = \dfrac{2}{3}$ and $P(C') = \dfrac{3}{4}$

Now, $P(A' \cap B' \cap C') = P(A')P(B')P(C')$

[$\because A, B$ and C are independent events]

$= \dfrac{2}{3} \times \dfrac{2}{3} \times \dfrac{3}{4} = \dfrac{1}{3}$

7 **(c)**

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

Favourable number of elementary events

$=$ Coeff. of x^{15} in $(x^1 + x^2 + x^3 + \dots + x^6)^3$

$=$ Coeff. of x^{15} in $x^3\left(\dfrac{1 - x^6}{1 - x}\right)^3$

$=$ Coeff. of x^{12} in $(1 - 3x^6 + 3x^{12} - x^{18})(1 - x)^{-3}$

$=$ Coeff. of x^{12} in $(1 - x)^{-3} - 3$ Coeff. of x^6 in $(-x)^{-3}$

$+ 3$ Coeff. of x^0 in $(1 - x)^{-3}$

$= {}^{12+3-1}C_{3-1} - 3 \times {}^{6+3-1}C_{3-1} + 3 = {}^{14}C_2 - 3$

$= {}^{14}C_2 - 3 \times {}^{8}C_2 + 3 = 91 - 84 + 3 = 10$

So, required probability $= \frac{10}{216} = \frac{5}{108}$

8 **(d)**

For a Poisson distribution, mean = variance

$\Rightarrow$ Variance = 16

$\therefore$ Standard deviation $= \sqrt{\text{Variance}}$

$= \sqrt{16} = 4$

9 **(a)**

The sum of two numbered on a dice is odd only, whence once is odd and second is even.

$\therefore$ Required probability

$= 2 \times$ probability of odd number

$\times$ probability of even number

[$\because$ Here, we multiply by 2 because either the even number is on first or second dice.]

$= 2 \times \left(\dfrac{5}{6}\right) \times \left(\dfrac{1}{6}\right) = \dfrac{5}{18}$

10 **(b)**

In binomial distribution, variance $= npq$ and mean $= np$.
From the given condition
$npq = 3$ and $np = 4$
$\therefore \frac{npq}{np} = \frac{3}{4}$
$\Rightarrow q = \frac{3}{4}, p = \frac{1}{4}$ and $n = 16$
Probability of exactly six success $= {}^{16}C_6\left(\frac{1}{4}\right)^6\left(\frac{3}{4}\right)^{10}$
11 **(a)**
Since A and B are independent events
$\therefore P(A \cap B) = \frac{1}{6}$ and $P(\bar{A} \cap \bar{B}) = \frac{1}{3}$
$\Rightarrow P(A)P(B) = \frac{1}{6}$ and $P(\bar{A})P(\bar{B}) = \frac{1}{3}$
$\Rightarrow P(A)P(B) = \frac{1}{6}$ and $\{(1 - P(A)\}\{(1 - P(B)\} = \frac{1}{3}$
$\Rightarrow 1 - [P(A) + P(B)] + \frac{1}{6} = \frac{1}{3}$
$\Rightarrow P(A) + P(B) = \frac{5}{6}$
Solving $P(A)\ P(B) = \frac{1}{6}$ and $P(A) + P(B) = \frac{5}{6}$, we get
$P(A) = \frac{1}{2}$ and $P(B) = \frac{1}{3}$ or, $P(A) = \frac{1}{3}$ and $P(B) = \frac{1}{2}$
Hence, option (a) is correct
12 **(b)**
Since, A and B are independent events
$\therefore P(A)P(B) = \frac{1}{6}$ and $P(\bar{A})P(\bar{B}) = \frac{1}{3}$
$\Rightarrow [1 - P(A)][1 - P(B)] = \frac{1}{3}$
$\Rightarrow 1 - [P(A) + P(B)] + P(A)P(B) = \frac{1}{3}$
$\Rightarrow 1 + \frac{1}{6} - \frac{1}{3} = P(A) + P(B)$
$\Rightarrow P(A) + P(B) = \frac{5}{6}$
$\Rightarrow P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$,
or $P(A) = \frac{1}{3}, P(B) = \frac{1}{2}$
13 **(a)**
$7^1 = 7, 7^2 = 49, 7^3 = 343, 7^4 = 2401, \ldots.$
Therefore, for $7^r, r \in N$ the no. ends at unit place 7, 9, 3, 1, 7,.... .
$\therefore 7^m + 7^n$ will be divisible by 5, if it end at 5 or 0.
But it cannot end at 5.

Also it cannot end at 0.
For this m and n should be as follows :

	m	n
1	$4r$	$4r+2$
2	$4r+1$	$4r+3$
3	$4r+2$	$4r$
4	$4r+3$	$4r+1$

For any given value of m, there will be 25 values of n. Hence, the probability of the required event is $\frac{100\times 25}{100\times 100}=\frac{1}{4}$.

14 **(c)**

A dice is thrown thrice, $n(S)=6\times 6\times 6$

Favorable events of $\omega^{r_1}+\omega^{r_2}+\omega^{r_3}=0$

ie, (r_1, r_2, r_3) are ordered triplets which can take values,

$$\left.\begin{matrix}(1,2,3),(1,5,3),(4,2,3),(4,5,3)\\(1,2,6),(1,5,6),(4,2,6),(4,5,6)\end{matrix}\right\}$$

ie, 8 ordered triplets and each can be arranged in 3! ways $=6$

$\therefore n(E)=8\times 6$

$$\Rightarrow P(E)=\frac{8\times 6}{6\times 6\times 6}$$

$$=\frac{2}{9}$$

15 **(c)**

We have,

Total number of functions from A to itself $=n^n$

Out of these functions, $n!$ Function are injections

So, required probability $=\frac{n!}{n^n}=\frac{(n-1)!}{n^{n-1}}$

16 **(d)**

Let $A_i(i=1,2,3,4)$ be the event that the urn contains 2,3,4 or 5 white balls and E the event that two white balls are drawn. Since the four events A_1,A_2,A_3,A_4 are equally likely. Therefore, $P(A_i)=\frac{1}{4}$,i $=1,2,3,4$

We have,

$P(E/A_1)=$ Prob. that the urn contains 2 white balls and both have been drawn

$$\Rightarrow P(E/A_1)=\frac{{}^2C_2}{{}^5C_2}=\frac{1}{10}$$

Similarly, we have

$$P(E/A_2)=\frac{{}^3C_2}{{}^5C_2}=\frac{3}{10},P(E/A_3)=\frac{{}^4C_2}{{}^5C_2}=\frac{3}{5},P(E/A_4)=\frac{{}^5C_2}{{}^5C_2}=1$$

Required probability $=P(A_4/E)=\frac{P(A_4)P(E/A_4)}{\sum_{i=1}^{4}P(A_i)P(E/A_i)}$

$$= \frac{\frac{1}{4} \times 1}{\frac{1}{4}\left(\frac{1}{10} + \frac{3}{10} + \frac{3}{5} + 1\right)} = \frac{1}{2}$$

17 **(b)**

There are 11 letters in word 'PROBABILITY' out of which 1 can be selected in $^{11}C_1$ ways.

There are four vowels viz. A,I,O. Therefore,

Number of ways of selecting a vowel $= {}^4C_1 = 4$

Hence, required probability $= \frac{4}{11}$

18 **(b)**

If the show a six, then number of outcomes =8

If die not show a six. Then number of outcomes=2

$\therefore$ Sample space $= 1 \times 8 + 2 \times 5 = 18$ points

19 **(c)**

Given, $n = 6$ and

$P(X = 2) = 9P(X = 4)$

$\Rightarrow {}^6C_2 p^2 q^4 = 9.{}^6C_4 p^4 q^2$

$\Rightarrow 9p^2 = q^2$

$\Rightarrow P = \frac{1}{3} q$

$\therefore$ We know that $p + q = 1$

$\Rightarrow \frac{q}{3} + q = 1$

$\Rightarrow q = \frac{3}{4}$ and $p = \frac{1}{4}$

$\therefore$ Variance $= npq$

$= 6.\frac{1}{4}.\frac{3}{4} = \frac{9}{8}$

20 **(a)**

Required probility $= \frac{{}^5C_1 \times {}^8C_1}{{}^{13}C_2} + \frac{{}^5C_2}{{}^{13}C_2} = \frac{25}{39}$

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