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

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

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

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 $P(C)=\frac{1}{4}$

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

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

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

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

7 **(c)**

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

Favourable number of elementary events

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

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

$=$ 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.]

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

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 $\{(1-P(A)\}\{(1-P(B)\}=\frac{1}{3}$

$\Rightarrow 1-[P(A)+P(B)]+\frac{1}{6}=\frac{1}{3}$

$\Rightarrow P(A)+P(B)=\dfrac{5}{6}$

Solving $P(A)\,P(B)=\frac{1}{6}$ and $P(A)+P(B)=\frac{5}{6}$, we get

$P(A)=\dfrac{1}{2}$ and $P(B)=\dfrac{1}{3}$ or, $P(A)=\dfrac{1}{3}$ and $P(B)=\dfrac{1}{2}$

Hence, option (a) is correct

12 **(b)**

Since, A and B are independent events

$\therefore P(A)P(B)=\dfrac{1}{6}$ and $P(\bar{A})P(\bar{B})=\dfrac{1}{3}$

$\Rightarrow\ [1-P(A)][1-P(B)]=\dfrac{1}{3}$

$\Rightarrow\ 1-[P(A)+P(B)]+P(A)P(B)=\dfrac{1}{3}$

$\Rightarrow\ 1+\dfrac{1}{6}-\dfrac{1}{3}=P(A)+P(B)$

$\Rightarrow\ P(A)+P(B)=\dfrac{5}{6}$

$\Rightarrow\ P(A)=\dfrac{1}{2}\,, P(B)=\dfrac{1}{3},$

or $P(A)=\dfrac{1}{3}\,, P(B)=\dfrac{1}{2}$

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,

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

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

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

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

$=\dfrac{2}{9}$

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

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

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

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

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

$\therefore$ 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)**

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

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