DPP
DAILY PRACTICE PROBLEMS

CLASS : XIth
DATE :

Solutions

SUBJECT : MATHS
DPP No. : 6

Topic :- PROBABILITY

2. There are 6 possible arrangements of a, b, c and only one of them is in alphabetical order.

Alternatively $\frac{{}^6C_3(\text{for a,b,c})\cdot 3!}{6!} = \frac{1}{6}$

4. $\left\langle \begin{matrix} WW \\ RRR \end{matrix} \right.$

S = {W W or $\underbrace{RWW}_{WRW}$ or $\underbrace{RRWW}_{\substack{WRRW \\ RWRW}}$ }

P(last drawn ball is white) = $\frac{2}{5}\cdot\frac{1}{4} + (2)\left(\frac{3}{5}\cdot\frac{2}{4}\cdot\frac{1}{3}\right) +$

$(3)\left(\frac{3}{5}\cdot\frac{2}{4}\cdot\frac{2}{3}\cdot\frac{1}{2}\right) = \frac{1}{10} + \frac{1}{5} + \frac{3}{10} = \frac{6}{10}$

5. P(H) = p ; P(T) = 1 – p

A wins if A throws a Tail before B tosses a Head

P(A) = P(T or H T T or H T H T T or ......)

[HTT ⇒ A throws Head and B throws Tail and again A throws a Tail]

$\therefore \frac{1-p}{1-p(1-p)} = \frac{1}{2} \Rightarrow 1 - p + p^2 = 2 - 2p$

$\Rightarrow p^2 + p - 1 = 0$

$\Rightarrow p = \frac{-1 \pm \sqrt{1+4}}{2} = \frac{\sqrt{5}-1}{2}$

7. Determinant = ad – bc

probability that randomly chosen product (xy) will be odd = P(both odd) = p^2

$\therefore$ Probability (xy) is even = $1 - p^2$

Now (ad – bc) is even

$\Rightarrow$ both odd or both even = $p^4 + (1 - p^2)^2$

Hence $p^4 + (1 - p^2)^2 = \frac{1}{2}$

put $p^2 = t$; $t^2 + (1 - t)^2 = \frac{1}{2}$ $\Rightarrow$ $2t^2 - 2t + \ = 0$ $\Rightarrow$ $4t^2 - 4t + 1 = 0$

$(2t - 1)^2 = 0$ $\Rightarrow$ $t = \frac{1}{2}$; $\therefore$ $p^2 = \frac{1}{2}$;

Hence $p = \frac{1}{\sqrt{2}}$

9. letters Digits

$26 \times 26 \times 1$ $\quad$ $10 \times 10 \times 1$

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

$= \frac{26\times26\times1}{(26)^3} + \frac{10\times10\times1}{(10)^3} - \frac{26\times26\times1}{(26)^3} \cdot \frac{10\times10\times1}{(10)^3}$

$= \frac{1}{26} + \frac{1}{10} - \frac{1}{260} = \frac{7}{52}$

12. $n(S) = 216$

x_1: number appearing on first dice.

x_2: number appearing on second dice.

x_3: number appearing on third dice.

$x_1 + x_2 + x_3 \le 10$ $(x_1, x_2, x_3 \in [1, 6])$

$\Rightarrow$ $x_1 + x_2 + x_3 \le 7$ (after giving 1 each to x_1, x_2, x_3)

$x_1 + x_2 + x_3 + X = 7$ (adding X as a false beggar)

Total number of solutions ${}^{(7+3)}C_3 = {}^{10}C_3 = 120$

Now, number of solutions when any one of x_1, x_2, x_3 takes the value 7 is $x_1 + x_2 + x_3 + X = 1$

$\Rightarrow$ ${}^{(1+3)}C_3 = {}^{4}C_3 = 4$

$\therefore$ total number of ways are ${}^{10}C_3 - {}^{4}C_3 \times {}^{3}C_1$

$= 120 - 12 = 108$

$\therefore$ required probability is $\frac{108}{216} = \frac{1}{2}$

14. Given $P(A) = \frac{1}{16}$; $P(B) = \frac{1}{16}$; $P(C) = \frac{2}{16}$;

$P(D) = \frac{3}{16}$; $P(e) = \frac{4}{16}$; $P(f) = \frac{5}{16}$;

$P(a, c, e) = P(A) = \frac{1}{16} + \frac{2}{16} + \frac{4}{16} = \frac{7}{16}$; $A^c = \{b, d, f\}$

$P(c, d, e, f) = P(B) = \frac{2}{16} + \frac{3}{16} + \frac{4}{16} + \frac{5}{16} = \frac{8}{16}$

$P(b, c, f) = P(C) = \frac{1}{16} + \frac{2}{16} + \frac{5}{16} = \frac{8}{16}$

$p_1 = P(A / B) = \frac{P(A \cap B)}{P(B)} = \frac{P(c,e)}{P(B)} = \frac{6}{14} = \frac{3}{7}$

$p_2 = P(B/C) = \frac{P(B \cap C)}{P(C)} = \frac{P(c,f)}{P(C)} = \frac{7}{8} = \frac{7}{8}$

$p_3 = P(C/A^c) = \frac{P(C \cap A^c)}{P(A^c)} = \frac{P(b,f)}{P(b,d,f)} = \frac{6}{9} = \frac{2}{3}$

$p_4 = P(A^c/C) = \frac{P(A^c \cap C)}{P(C)} = \frac{P(b,f)}{P(b,c,f)} = \frac{6}{8} = \frac{3}{4}$

Hence $p_1 = \frac{72}{168}$; $p_2 = \frac{147}{168}$; $p_3 = \frac{112}{168}$; $p_4 = \frac{126}{168}$;

$p_1 < p_3 < p_4 < p_2 \Rightarrow$ (C)

15. Events are defined as
E_1 = A rigged die is chosen
E_2 = A fair die is chosen
A = die shows 5 in all the three times
using Baye's Theorem :

$P(E_1/A) = \frac{P(E_1)\,P(A/E_1)}{P(E_1)\,P(A/E_1) + P(E_2)\,P(A/E_2)}$

$= \frac{\frac{1}{4}\times(1)^3}{\frac{1}{4}\times(1)^3 + \frac{3}{4}\times\left(\frac{1}{6}\right)^3} = \frac{216}{219}$

16. 'a' can take only one value i.e. 2 Note: absolute
'b' can be 1 or 3 i.e. two values
'c' can be 2 or 4 i.e. two values
and 'd' can take only one value i.e. 5
hence total favourable ways = 1 × 2 × 2 = 4
$n(S) = 6^4 = 1296$

$P(E) = \frac{4}{1296} = \frac{1}{324}$

17. Probability problem is not solved by A $= 1 - \frac{1}{2} = \frac{1}{2}$

Probability problem is not solved by B $= 1 - \frac{1}{3} = \frac{2}{3}$

Probability problem is not solved by C $= 1 - \frac{1}{4} = \frac{3}{4}$

Probability of solving the problem = 1 – P (not solved by any body)

$\therefore\ P = 1 - \frac{1}{2}\cdot\frac{2}{3}\cdot\frac{3}{4} = 1 - \frac{1}{4} = \frac{3}{4}$

18. $P(A \cup B) = \frac{3}{4}$, $P(A \cap B) = \frac{1}{4}$

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

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

$\frac{1}{4} = \frac{1}{3} + P(B) - \frac{3}{4} \quad \Rightarrow P(B) = \frac{2}{3}$

$P(\ \cap B) = P(B) - P(A \cap B)$

$= \frac{2}{3} - \frac{1}{4} = \frac{8-3}{12} = \frac{5}{12}$.

19. Probability of getting odd p = $\frac{3}{6} = \frac{1}{2}$

Probability of getting others q = $\frac{3}{6} = \frac{1}{2}$

Variance = npq = 5. $\frac{1}{2} . \frac{1}{2} = \frac{5}{4}$

20. Out of 5 horses only one is the winning horse. The probability that Mr. A selected the losing horse = $\frac{4}{5} \times \frac{3}{4}$

$\therefore$ The probability that Mr. A selected the winning horse = 1 – $\frac{4}{5} \times \frac{3}{4} = \frac{2}{5}$

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