Probability

* Probability of occurance of Event E is denoted by P(E) and

$$P(E) = \frac{\text{no. of cases favourable to } E}{\text{total no. of cases.}} = \frac{a}{a+b}$$

where. a ⇒ favourable no. of cases
b ⇒ non-favourable " " "

⇒ $0 \leq P(E) \leq 1$
Impossible — sure event

⇒ Here a : b = odd in favour of event E
b : a = ~~or~~ or against favour of Event E.

$$P(E') = \frac{b}{a+b}$$

$$P(E) + P(E') = 1$$

Q.1 from a pack of 52 card 3 card are drawn at random. find the Probability that drawn is a king, a Q, and a J.

$$P(E) = \frac{{}^4C_1 \; {}^4C_1 \; {}^4C_1}{{}^{52}C_3}$$

Q. from a pack 2 cards are drawn. find the chance are both are king.

$$P(E) = \frac{{}^4C_2}{{}^{52}C_2}$$

Q. 2 dice thrown the Simer

(i) What is the chance that sum of score is 7.

(1,6) (2,5) (3,4) (4,3) (5,2) (6,1)

$P(E) = \frac{6}{36} = \frac{a}{a+b}$ a = 1, b = 5

odd in favour of E = 1 : 5

odd againest favour of E = 5 : 1

HCF=1

(ii) Chance that selected no. are Relatively Prime (Co-prime)

~~(1,2)~~ (1,2) (1,5) ((2,

(1,2)	(2,1)	(2,3)	(3,2)
(1,3)	(3,1)	(2,5)	(5,2)
(1,4)	(4,1)	(3,5)	(5,3)
(1,5)	(5,1)	(3,4)	(4,3)
(1,6)	(6,1)	(4,5)	(5,4)
		(6,5)	(5,6)

$P(E) = \frac{22}{6 \cdot 6}$

(iii) getting the score is less then 12.

(1,6)	(6,1)	(1,5)	(5,1)
(2,6)	(6,2)	(2,5)	(5,2)
(3,6)	(6,3)	(3,5)	(5,3)
(4,6)	(6,4)	(4,5)	(5,4)
(5,6)	(6,5)	(5,5)	(5,5)

(E) — Sum < 12

E' = Sum = 12

$P(E') = \frac{1}{6 \cdot 6} = \frac{1}{36}$

$P(E) = 1 - P(E')$

$= 1 - \frac{1}{36}$ Ans

Q. 10 Shoes (5 Pairs) are line on a almira rack. a ~~...~~ Chunnu reaches their and randomly pick 4 shoes find the that they form exactly one pair of shoes.

$L_1 \quad L_2 \quad L_3 \quad L_4 \quad L_5$

$R_1 \quad R_2 \quad R_3 \quad R_4 \quad R_5$

$$P(E) = \frac{{}^5C_1 \cdot {}^4C_2 \cdot {}^2C_1 \cdot {}^2C_2}{{}^{10}C_4}$$

Q. A square matrix of 2^{nd} order is made with the element 0 or 1. A matrix is chosen from above set then what is the chance that it is singular.

$A \begin{pmatrix} 1 & 1 \\ 0 & 1 \end{pmatrix}$ Element $\in [0, 1]$

$|A| = \begin{vmatrix} 1 & 1 \\ 0 & 1 \end{vmatrix} \rightarrow$ If $|A| \neq 0$ then A is non-singular

If $|A| = 0$ then A is singular

$E = \left\{ \begin{bmatrix} 0 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix} \right.$

$\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 1 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, \begin{bmatrix} 0 & 1 \\ 0 & 0 \end{bmatrix}$

$P(E) = \frac{6}{16}$

$\begin{vmatrix} 0 & 0 \\ 0 & 0 \end{vmatrix} \quad \begin{vmatrix} 1 & 0 \\ 1 & 0 \end{vmatrix}$

$\begin{vmatrix} 1 & 0 \\ 0 & 0 \end{vmatrix} \quad \begin{vmatrix} 1 & 1 \\ 0 & 0 \end{vmatrix}$

$\begin{vmatrix} 0 & 1 \\ 0 & 0 \end{vmatrix} \quad \begin{vmatrix} 0 & 1 \\ 0 & 1 \end{vmatrix}$

$\begin{vmatrix} 0 & 0 \\ 1 & 0 \end{vmatrix} \quad \begin{vmatrix} 0 & 0 \\ 1 & 1 \end{vmatrix}$

$\begin{vmatrix} 0 & 0 \\ 0 & 1 \end{vmatrix}$

$P(E) = \frac{10}{2 \cdot 2 \cdot 2 \cdot 2}$ Ans

Q. 4 A^{pple} and 3 O^{range} are randomly place in aline.
find the chance that ~~to~~ 2 Extreme fruits are both oranges

$$P(E) = \frac{{}^3C_2 \lfloor 2 \lfloor 5}{\lfloor 7} \quad \text{Ans} \quad = \frac{4A}{L}$$

Q. $N = \{1, 2, 3, \ldots - 20\}$

first 20 Naturals No.
2 Natural no. are Randomly selected
(i) what is the chance that the sum is odd.
$\{1,2\}\ \{1,4\}, \{1,6\}\ (1,10)\ (1,12)\ (1,16)\ (1,18)$

odd - $\{1, 3, \ldots 19\}$
Even - $\{2, 4, 6, 8, 12 - 18, 20\}$

$$P(E) = \frac{(\text{odd + Even})}{{}^{20}C_2} \quad P(E) = \frac{{}^{10}C_1 \cdot {}^{10}C_1}{{}^{20}C_2}$$

(ii) what is the P that sum even

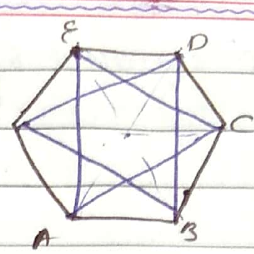
$$P(E) = \frac{{}^{10}C_2 \cdot {}^{10}C_2}{{}^{20}C_2} \quad \text{Ans}$$

E + O =
E + E = E
O + O = E

(iii) if 3 no. are selected then what is the chance that the no. arrange A.P.
(1 2 3) (

$$P(E) = \frac{1 \cdot {}^{10}C_2 + {}^{10}C_2 \cdot 1}{{}^{20}C_3}$$

Q: A regular hexagon 3 vertices of a Regular hexagon are joint randomly find the Chance that an equilateral triangle is formed.

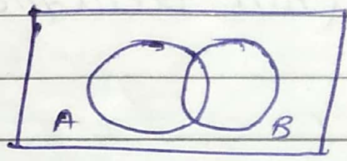


$$P(E) = \frac{{}^{2}C_{1}}{{}^{6}C_{3}}$$

Addition theorem of Probability:

If A and B are two events then

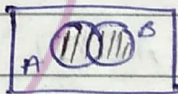
$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$



$$\frac{n(A \cup B)}{n(S)} = n(A) + n(B) - n(A \cap B)$$

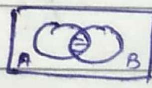
all divide by $n(S)$

(i) $(A \cup B)$ = occurance of atleast 1



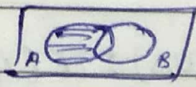
(ii) $(A \cap B)$ = simultaneously occurence of both

– A Joint occurance of Both

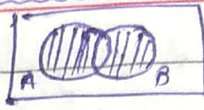


(iii) $\bar{A}$ = non occurance of A

(iv) $A \cap B'$ = occurance of A but not B
$= A - B$



$$\boxed{P(A \cap B') = P(A) - P(A \cap B)}$$

$\times$ P(Occurance of exactly one) = 

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

$= P(A) + P(B) - 2P(AB)$

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

$\star$ $\boxed{\begin{array}{l}(A \cup B)' = A' \cap B' \\ (A \cap B)' = A' \cup B'\end{array}}$ — Damburgan Law

$\Rightarrow$ P(non occurance of both) $= P(A' \cap B') =$ 

$P(A' \cap B') = 1 - P(A \cup B)$

$P(\overline{A \cup B}) = 1 - P(A \cup B)$

$\Rightarrow$ P(occurance of at least one or Both) $= P(A \cup B) =$

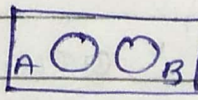
$P(A \cup B) = 1 -$ P(non-occurance of A & B)

$P(A \cup B) = 1 -$ P(neither A nor B)

$\boxed{\text{Occurance of either of them} = 1 - \text{neither A nor B}}$ Imp

no common in both

$\star$ If A and B are mutually Exclusive

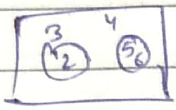
$\boxed{P(A \cup B) = P(A) + P(B) - \cancel{P(A \cap B)}^{0}}$ 

disjoint

Exh 20 0–1

* Ex: (a) $S = \{1, 2, 3, 4, 5, 6\}$ $A = \{1, 2\}$ $B = \{5, 6\}$

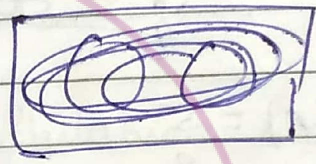
disjoint. (nothing common).



Q: is the ...

$\Rightarrow$ if A and B are Exhaustive event

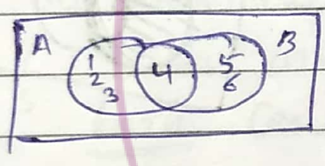
Ans: ① A loint



$S = \{1, 2, 3, 4, 5, 6\}$

$A = \{1, 2, 3, 4\}$ A and B

$B = \{4, 5, 6\}$ are not Exhaustive.



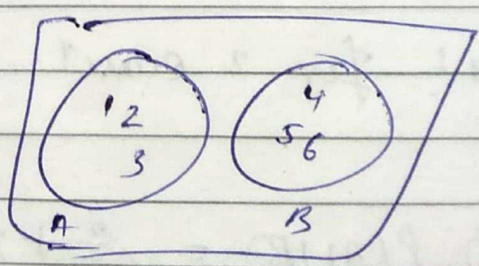
$P(A \cup B) = 1 = P(A) + P(B) - P(A \cap B)$

Here A and B are not any mutual Exclusive.

$\Rightarrow S = \{1, 2, 3, 4, 5, 6\}$

$A = \{1, 2, 3\}$

$B = \{4, 5, 6\}$



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

$1 = P(A) + P(B)$

Both Mutually Exclusive and Exhaustive

= at ...

Mutually Excl. = no common. $P(A \cap B) = 0$

Exhaustive = A हो या तो B होना जरूरी है

Q. for two events A and B

let $P(A \cup B) = 7/8$

$P(A \cap B) = \frac{1}{4}$

$P(\bar{A}) = \frac{5}{8}$

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

find $P(A)$

$P(B)$

$P(A \cap B')$

$\cancel{P(\bar{A}) = \frac{5}{8}}$

$\frac{7}{8} = \frac{3}{8} + P(B) - \frac{1}{4}$

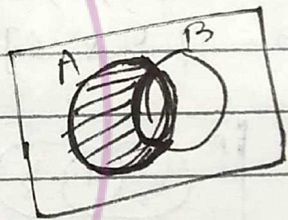
$\cancel{P(A) =}$

$P(B) = \frac{3}{4}$

$\cancel{\frac{7}{8} = P(A) +}$

$1 - P(A) = \frac{5}{8}$

$P(A) = 1 - \frac{5}{8} = \frac{3}{8}$



at least

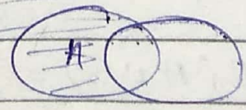
$P(A \cap B') = P(A) - P(A \cap B)$

$= \frac{3}{8} - \frac{1}{4} = \frac{1}{4}$

Que: for 2 event let $P(A) = \frac{3}{8}$

$P(B) = \frac{1}{2}$ $P(A \cap B) = \frac{1}{4}$

(I) $P(A \cup B) = \frac{3}{8} + \frac{1}{2} - \frac{1}{4} =$



(II) $P(\bar{A}) = 1 - P(A) \cancel{- P(A \cap B)} =$

(III) $P(\bar{B}) = 1 - P(B)$

(iv) $P(A' \cap B') = \cancel{P(A') \cup P(B')} = P(A \cup B)' = 1 - P(A \cup B)$

(v) $P(A' \cup B') = \cancel{P(A') \cap P(B')} = P(A \cap B)' = 1 - P(A \cap B)$

(vi) $P(A' \cap B) = \cancel{P(A') \cup P(B)} = P(B) - P(A \cap B)$

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

$\boxed{\text{Mutu} = \text{no. common}}$

A होने पर B - Exh.

$A \cup B \Rightarrow$ occurrence of at least one

Q. 2 cards are drawn from a pack at random find the probability that both cards are of red colour or they are queen.

$\frac{26}{52} = \frac{1}{2}$

A → दोनों Red

B → दोनों रानी

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

$= \frac{{}^{26}C_2}{{}^{52}C_2} + \frac{{}^{4}C_2}{{}^{52}C_2} - \frac{{}^{2}C_2}{{}^{52}C_2}$

$\frac{12 \times 23}{26 \times 51}$

$= \frac{282}{26 \times 51}$

Q. Prob. that franchi will get plumbing contract is $\frac{2}{3}$ and he will get an electric contract $\frac{5}{9}$. If the prob. that franchi will get at least one contract is $\frac{4}{5}$ then what is the prob. that franchi will get both contract.

$P(A) \Rightarrow$ plumbing cont. $= \frac{2}{3}$

$P(B) =$ electric contract.

$(A \cup B)$

$P(A) = \frac{2}{3}$ and $P(B) = \frac{5}{9}$

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

$\frac{4}{5} = \frac{2}{3} + \frac{5}{9} - P(A \cap B)$

Q. 2 ~~for a p~~ Prob. that horse A winning race is $\frac{1}{3}$ and that of B is winning race $= \frac{1}{5}$. Find prob. that either of them will win the race (ii) non of them will win the race

$E =$ Horse A win race $\quad P(E) = \frac{1}{3}$

$F =$ " B " " $\quad P(F) = \frac{1}{5}$

(i) $P(A \cup B) = P(A) + P(B) - \cancel{P(A \cap B)}$ $\quad$ (ii) ~~$P(A \cup B) = P(A \cap B)$~~

(i) $P(E \cup F)$ $\quad P(E' \cup F')$

IES

P(E

Event E and F are is mutually and not Exhaustive

(i) $P(E \cup F) = P(E) + P(F) - \cancel{P(E \cap F)}^{0}$ $= \frac{1}{3} + \frac{1}{5}$

(ii) $P(E' \cap F') - P(E \cup F)' = 1 - P(E \cup F)$

Q: For ~~A~~ class ~~[illegible]~~ in India railway French and change appear in ~~change~~ ~~[illegible]~~ interview. The probability that for being sel. is 3 that of ~~[illegible]~~ changer. What is the individual prob. of each. (H.B)

A = French being selected $(A + B) = 1$

B = H.B being selected

$P(A) = 3 P(B)$ $P(E \cup F) = 1$

$(A)' = \frac{A}{A}$

$P(A \cup B) = P(A) + P(B) - \cancel{P(A \cap B)}^{0}$

$1 = 3n + n$

$n = \frac{1}{4}$

* Conditional Prob!

Let A and B are 2 Events such that $P(A) > 0$ then $P\left(\frac{B}{A}\right)$ denotes Conditional Prob. of B given that A has occured. Since A is known to occured so it become new sample space and

$$\boxed{P\left(\frac{B}{A}\right) \text{ is } = \frac{P(A \cap B)}{P(A)}}$$

* multiplication theorem:

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

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

Note:

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

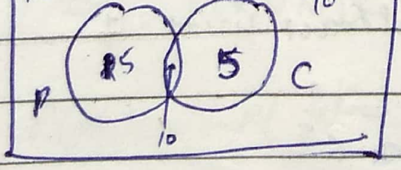
Ex 1 $S = \{1,2,3,4,5,6\}$ $\quad P(\text{छक्का आएं}) = \frac{1}{6}$

$\{2,4,6\}$ $\quad P\left(\frac{\text{छक्का}}{\text{Even}}\right) = \frac{1}{3}$

Ex=2 $\quad 80\,B + 20\,G \quad P = \frac{1}{100}$

TEOT 1G is selected $\quad P\left(\frac{\text{लड़की}}{\text{[illegible]}}\right) = \frac{1}{20}$

Q. In a certain Collage 25% Student fail in Physics, 15% fail in Chem. and 10% fail in Both. A Student is selected at randomly



(i) $P(A)$

$A(P \cap C) = 10$.

(ii) if He is fail in Chem. then what is the Prob that he failed in Phy $\quad P(A) = .25 \quad P(B) = .15$

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

$$P\left(\frac{\text{fail in Physics}}{\text{C}}\right) = \frac{10}{15} = \frac{2}{3}$$

fail in Chem.

$$\frac{P(E \cap F)}{P(F)} = \frac{10/100}{15/100} = \frac{10}{15} = \frac{2}{3}$$

(ii) what : is failed in phy and chem or both

$$P\left(\frac{P(E \cup F)}{\cancel{\text{failed in phy}}\text{ or chem}}\right. = \frac{30}{100} = \frac{3}{10}$$

$$P(E \cup F) = \frac{30}{100} = \frac{3}{10} =$$

Q Event $P(E) = 0.6$
$P(F) = 0.3$
& $P(E \cap F) = 0.2$

find i) $P\left(\frac{E}{F}\right)$

(ii) $P\left(\frac{F}{E}\right)$

(i) $P\left(\frac{E}{F}\right) = \frac{P(E \cap F)}{P(F)} = \frac{0.2}{0.3}$

(ii) $P\left(\frac{F}{E}\right) = \frac{P(F \cap E)}{P(E)} = \frac{0.2}{0.6}$

Q. In a Experiment we rolled a fair die five times define two event $E \rightarrow$ Outcome is sequ. 1,2,3,4,5)
$F \rightarrow$ sequence start with 1

(i) $P(E) = \cancel{?} \cdot \frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} \cdot \frac{1}{6} = \frac{1}{6^5}$ $\qquad \frac{5}{6^6}$

(ii) $P(F) = \frac{1}{6} \cdot \frac{6}{6} \cdot \frac{6}{6} \cdot \frac{6}{6} \cdot \frac{6}{6} \cdot \frac{6}{6} = \frac{\cancel{6}}{6}$

(iii) What is Prob. that no. ~~4~~ 2 appears exactly twice

Ans $\frac{1}{6}$, P(appears exactly twice) $\boxed{2 \mid - \mid \mid -}$

$^5C_2 \cdot \frac{5}{6} \cdot \frac{1}{6} \cdot \frac{5}{6} \cdot \frac{5}{6} \cdot \frac{1}{6}$

(iv) find $P\left(\frac{F}{E}\right) = 1$, $\frac{P(F \cap E)}{P(E)} = \frac{1}{1/6^5}$

(v) $P\left(\frac{E}{F}\right) = \frac{P(E \cap F)}{P(F)} = \frac{1/6^5}{1/6} = \frac{1}{6^4}$

दी गया

(vi)
A ship is fitted with 3 engine E_1, E_2, E_3 the engine fn independently each other w. respective P.

$E_1 = \frac{1}{2}$

$E_2 = \frac{1}{4}$ For the ship to be operational atleast

$E_3 = \frac{1}{4}$. 2 engine functionally.

let $X \rightarrow$ ship is operational

$X_1, \rightarrow$ Engine E_1 functional

$X_2 \rightarrow$ Engine E_2 " $P(X_1) = 1/2$

$X_3 \rightarrow$ " E_3 " $P(X_2) = 1/4$

then find value of $P(X)$. $P(X_3) = 1/4$

$^3C_2 \cdot P(X_1 \cup X_2) =$

$P(X) = P($ दोनों E fn Ei $) + P($ तीनों E fn Ei $)$

$= P(x_1 x_2 x_3') + P(x_1 x_2' x_3) + P(x_1' x_2 x_3) + P(x_1 x_2 x_3)$

$= \frac{1}{2} \cdot \frac{1}{4} \cdot \left(1 - \frac{1}{4}\right) + \frac{1}{2} \cdot \left(1 - \frac{1}{4}\right) \cdot \frac{1}{4} + \left(1 - \frac{1}{2}\right) \cdot \frac{1}{4} \cdot \frac{1}{4} + \frac{1}{2} \cdot \frac{1}{4} \cdot \frac{1}{4}$

Q. $P\left(\frac{x}{x_2}\right) =$

$$P\left(\frac{x}{x_2}\right) = \frac{P(x \cap x_2)}{P(x_2)} = \frac{P(x_1 x_2 x_3') + P(x_1' x_2 x_3) + P(x_1 x_2 x_3)}{1/4}$$

Q. $$P\left(\frac{x_1'}{x}\right) = \frac{P(x_1' \cap x)}{P(x)} = P(x_1' x_2 x_3) + P(x_1 x_2 x_3') + P(x_1 x_2 x_3)$$

$$\frac{P(x_1' x_2 x_3)}{P(x_4)}$$

* Independent Events:

Two events A and B are said to be independent if occurance or non-occurance of one does not affect the probability of occurence or non occurance of other

if E and R independent

Ex! E = SRS Sir IIT/ee 46' 2E' E — Both are independent
F = Trump President USA

$$\boxed{P(E \cap F) = P(E) \cdot P(F)}$$

E & F are independent then
- E & F' are I
E' & F " "
E' & F' " "

$P(E \cap F) = P(E) \cdot P(F)$

* If E and R is independent

$$P(E \cup F) = P(E) + P(F) - P(E \cap F)$$
$$= P(E) + P(F) - P(E)P(F)$$

or

$$P(E) + P(F)(1 - P(E))$$

* If E and R is independent then

~~P(neither A occur nor B)~~

$$\boxed{P(\text{Occurance of at least one}) = 1 - P(E')P(F')}$$

Note: If E, F and G are independent

$$P(E \cup F \cup G) = 1 - P(E')P(F')P(G')$$

Q. The Prob. that a man live 10 year more is $\left(\frac{1}{4}\right)$. Prob of his wife will live 10 more year is $\frac{1}{3}$.

E = man live 10 year more = $P(E) = \frac{1}{4}$

F = his wife 10 more year = $P(F) = \frac{1}{3}$

Find the prob. that

(i) Both will alive in next 10 year

$$P(E \cap F) = P(E)P(F) = \frac{1}{4} \cdot \frac{1}{3}$$

(ii) at least one will alive:

$$P(= 1 - P(E')P(F') \Rightarrow$$

$$P(A \cup B) = P(E) + P(F) - P(E \cap F) = \frac{1}{4} + \frac{1}{3} - \frac{1}{4} \cdot \frac{1}{3}$$

(iii) neither will alive $\Rightarrow P(E') \cdot P(F')$

$$= \left(1 - \frac{1}{4}\right) \cdot \left(1 - \frac{1}{3}\right)$$

Q. E and F are two ind. Events. The Prob. that both E and F happen is $\left(\frac{1}{12}\right)$. Prob. that neither E nor F is $\frac{1}{2}$

$P(E \cap F)$

$P(E \cap F) = P(A)$

$P(E) = x$

$P(F) = y$

Find $P(E)$ and $P(F)$

$$P(E')P(F') = \frac{1}{2}.$$

$= P(E \cap F) = P(E)P(F)$

Face,

$P(E\cap F) = P(E)\cdot P(F)$

$\frac{1}{2} \Rightarrow xy =$

$P(E'\cap F') = P(E')\cdot P(F')$

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

Que: 4 Person are asked the same Que by an interview if each have independent Probabi. $\frac{1}{6}$ of Ans Que. independently. then find the prob. that atleast one Ans correctly

Ans $P(\cancel{A\cap B}) = \cancel{P(A)\cdot P(B)}$

$= \frac{1}{6}$

$P(E\cup F\cup G\cup H) = 1 - P(E')P(F')P(G')P(H)$

$= 1-\left(1-\frac{1}{8}\right)^4$

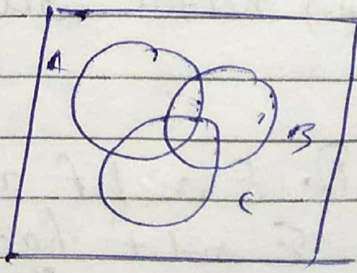
$= 1-\left(\frac{5}{6}\right)^4.$

$\boxed{P(A)}$

* three events:

if A, B, and C are three events then addition theorem

$P(A\cup B\cup C) = P(A)+P(B)+P(C)+P(AB)-P(BC)-P(CA)+P(A\cap B\cap C)$

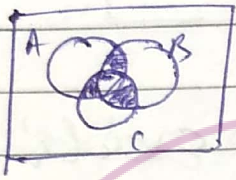


$\cup$ is occurance of at least one

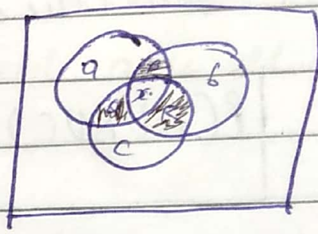
* $(A \cup B \cup C) \rightarrow$ occurance of at least one

$A \cap B \cap C \rightarrow$ Joint occurance of all

$(A \cap B \cap \bar{C}) \cup (A \cap \bar{B} \cap C) \cup (\bar{A} \cap B \cap C)$ = occurance of exactly two



OR.



$\Rightarrow P(A \cap B) + P(B \cap C) + P(CA) - 3P(ABC)$

$p + x + x + r + q + x - 3x$

$p + q + r$

* Occurance of atleast two

$P(A \cap B) + P(BC) + P(CA) - 2P(ABC)$

$(A \cap B \cap \bar{C}) \cup (A \cap \bar{B} \cap C) \cup (\bar{A} \cap B \cap C) \cup (A \cap B \cap C)$

* Occurance of exactly one

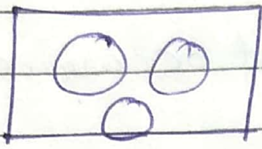
$$\boxed{P(A) + P(B) + P(C) - 2P(AB) - 2P(BC) - 2P(CA) + 3P(ABC)}$$

OR

$(A \cap \bar{B} \cap \bar{C}) \cup (\bar{A} \cap B \cap \bar{C}) \cup (\bar{A} \cap \bar{B} \cap C)$

*

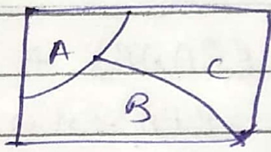
* If A, B, C are Mutually Exclusive events



$$\boxed{P(A \cup B \cup C) = P(A) + P(B) + P(C)} \le 1$$

* If A, B, and C are Mutually Exclusive and exhaustive event

$$\boxed{P(A \cup B \cup C) = P(A) + P(B) + P(C) = 1}$$



* Occurance of at least one event

$$\boxed{P(A \cup B \cup C) = 1 - P(A')P(B')P(C')}$$

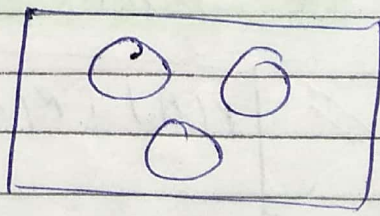
* If A, B and C are Three Pair wise Mut. Exclusive then they are mutually Exclusive

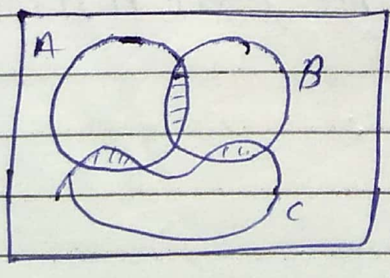
• However if A, B and C are M.E ~~this~~ does not

$\not\Rightarrow$ they are Pair M.E

Exam

$A \cap B \cap C = \phi$





*** If A, B ~~and~~ are independent events then

$$\boxed{P(A \cap B) = P(A) \cdot P(B)}$$

→ Here A & B, A' & B, A & B', A' & B' are independent. addition theorem holds.

* If A, B and C are independent then

(i) they are pair wise independent as well as

(ii) M. Independent taken all

i.e. if A, B and C are independent

i) A & B are independent i.e $P(A \cap B) = P(A) \cdot P(B)$

ii) A & C are independent i.e $P(A \cap C) = P(A) \cdot P(C)$

iii) B & C " i.e $P(B \cap C) = P(B) \cdot P(C)$

iv) A & B, C are " i.e $P(A \cap B \cap C) = P(A) P(B) P(C)$

[all three are be satisfied in all the points.]

Note: for n independent events, the total no. of condition required $= \boxed{2^n - n - 1}$

$n = 2$ the cond $= 2^2 - 2 - 1$
$= 1$

V.I

V.I

$n = 3$ then condition
: $2^3 - 3 - 1 = 4$

* if A, B and C are ind. events then occurrence of at least one event

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

$= P(A) + P(B) + P(C) - P(A)P(B) - P(B)P(C)$
$- P(C)P(A) + P(A)P(B)P(C)$

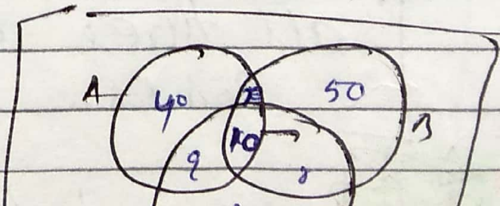
or

$= 1 - P(A')P(B')P(C')$

Q. there are 3 clubs A, B, C in big city with
A — 40
B — 50
C — 60 member respectively.

10 people members of all ~~3~~ clubs   10 — 3 club
70 are member only one club   70 — 1 club

A person is selected randomly, find the prob. that he had membership of 2 clubs



$P(A \cap B) + P(B \cap C) + P(C \cap A) - 3P(A \cap B \cap C)$

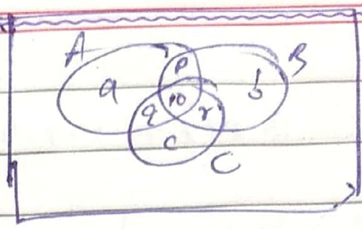
$= x + x + x - \cancel{30}\ 3(10)$

$= 3x - 30$

the value of x

$a + b + c = 70$ ...(i)
$40 = a + p + q + 10$
$a + p + q = 30$ ...(ii)
$b + p + r = 40$ ...(iii)

$p+q+r = 50$ —(iv)



$a+b+c+2(p+q+r) = 120$

$p+q+r = 25$ —(v)

$$P(E) = \frac{25}{a+b+c+p+q+r+10}$$

$$= \frac{25}{70+25+10} = \frac{25}{105} \text{ Ans}$$

Q 3 Persons A, B, C fired at a target independent. Suppose $P(A) = \frac{1}{6}$, $P(B) = 1/4$, $P(C) = 1/3$ denote Prob. the reaching the target.

(i) find the Prob. that Exactely one of them will target

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) - 2P(A \cap B) - 2P(BC) - 2P(CA) + 3P(ABC)$$

$P(A)\cdot P(B)$ $\quad$ $P(B)P(C)$ $\quad$ $P(C)P(A)$ $\quad$ $P(A)P(B)P(C)$

$$= \frac{1}{6} + \frac{1}{4} + \frac{1}{3}$$

$= P(A) +$ OR.

$$P(A)P(B')P(C') + P(A')P(B)P(C') + P(A')P(B')P(C)$$

(ii) find Prob. that targed by hit Exact two

$$= P(A)P(B)P(C)' + P(A)P(B')P(C) + P(A')P(B)P(C)$$

OR

$2P(AB) + 2P(BC) + 2P(CA) - 3P(ABC)$

Q. at least one of them hit the target

$P(\cancel{A \cup})$

$= 1 - P(A')P(B')P(C')$

OR

$= P(A) + P(B) + P(C) - P(A)P(B) - P(B)P(C) - P(C)P(A)$
$+ P(A)P(B)P(C)$

Q. if target is hit only once then find the prob. that it was the man A. (A)

A → ~~man~~ man A

B → not hit

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

$P\left(\frac{\text{By } A}{\text{Ept. I } (A)}\right) = \frac{1}{P(A)P(B')P(C') + P(A')P(B)P(C) + P(A')P(B)P(C')}$

Q. $P(A) = 1/2 \quad P(B) = 1/3 \quad P(A \cap B) = 1/4$

(i) find $P\left(\frac{A}{B}\right) = \frac{P(A \cap B)}{P(B)} = \frac{1/4}{1/3} = \frac{3}{4}$

(2) $P\left(\frac{B}{A}\right) = \frac{P(B \cap A)}{P(A)} = \frac{1/4}{1/2}$

iii) $P(A \cup B) = \frac{1}{2} + \frac{1}{3} - \frac{1}{4}$.

(4) $P\left(\frac{A'}{B'}\right) = \frac{P(A' \cap B')}{P(B')} = \frac{P(\cancel{1 - A \cap B})}{P(B')} = \frac{P(A \cup B)'}{1 - P(B)}$

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

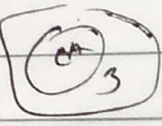
(5) $P\left(\frac{B'}{A}\right)$ $P\left(\frac{B}{A'}\right) = \frac{P(B \cap A')}{P(A)}$

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

Note!

M. Exclusive events can be used when event are taken from same experiment and independence can be used when the events are taken from diff.

Q. find $P\left(\frac{B}{A}\right)$ if $\frac{P(A \cap B)}{P(A)}$



(i) A is subset of B $P\left(\frac{B}{A}\right) = \frac{P(B \cap A)}{P(A)} = \frac{P(A)}{P(A)} = 1$

(ii) A and B are disjoint $= \frac{0}{P(A)} = 0$

Q. A Bag contain 1 Red and 2 Black Ball. Two People A & B in order draw one Ball from the Bag and Put it Bag after noting its Colour then cont. doing it indefi. unless one who drop the first Once the game. Compute their. of Red win

$\boxed{1R+2B}$

$P(A\ win) = R + BBR + BBBBR + BBBBBBR$ ——— ∞

$R + B^2R + B^4R + B^6R$

$= \frac{1}{3} + \left(\frac{2}{3}\right)^2 \frac{1}{3} + \left(\frac{2}{3}\right)^4 \left(\frac{1}{3}\right) + \left(\frac{2}{3}\right)^6 \frac{1}{3} +$ ——— ∞

$\frac{1}{3}\left(1 + \left(\frac{2}{3}\right)^2 + \left(\frac{2}{3}\right)^4 - \infty\right)$

$a = \frac{1}{3} \quad r = \left(\frac{2}{3}\right)^2 = \frac{4}{9}$ $\quad \frac{a}{1-r}$

$= \frac{1/3}{1-4/9} = \frac{1/3}{5/9} = 3/5$

$P(B\ win) = \cancel{B + RB + RRRB + RRRRRB}$

$= \cancel{B + RB + RRRB + RRRRB}$ ——— ∞

$= BR + B^3R + B^5R +$ ——— ∞

$= \frac{2}{3}\frac{1}{3} + \left(\frac{2}{3}\right)^3 \frac{1}{3}$ ——— ∞

$\frac{\frac{2}{3}\cdot\frac{1}{3}}{1-4/9}$ — or $1 - P(A)$

$= 1 - \frac{3}{5} = \frac{2}{5}$

Q $\boxed{1R+2B+3Y}$

$P(A\ win) = R + BBYR + BBBBYYR + \ldots \infty$

$\frac{1}{6} + \frac{2}{6}\left(\frac{3}{6}\right)\left(\frac{1}{6}\right) + \left(\frac{2}{6}\right)^2\left(\frac{3}{6}\right)^2\left(\frac{1}{6}\right)$ ——— ∞

$P(A) = W + LLLW + L^6 W - - - \infty$.

$P(W) = \frac{1}{6} \quad P(L) = \frac{5}{6}$

$P(B\ win) = LW + LLLLW + L^7 W + \text{———} \infty$

* Binomial Prob. distribution :-

for independent trials an experiment

↓

n independent trials (Bernoli trial).

↓

Each of these ~~two~~ trials have 2 Possible Outcome

$p + q = 1$

success p

failure q

$P(\text{Success}) = p$

$P(\text{failure}) = q = 1 - p$

then $P(X = r) \equiv P(r\ \text{success}) = {}^{n}C_{r}\, p^{r} q^{n-r}$.

Ex:- A pair of dice is thrown is

Q. A pair of dice is thrown 6 times and getting a doublet is consider as success. Compute the Prob. of

(i) no success $\qquad P(S) = p = \frac{1}{6}$

(ii) excatly two success $\qquad P(F) = q = \frac{5}{6}$

(iii) atmost two success

(iv) atleast ~~two~~ one success

(v) atleast three success

$$(q+p)^6 = \underbrace{{}^6C_0 q^6}_{P(X=0)} + \underbrace{{}^6C_1 q^5 p^1}_{P(X=1)} + \underbrace{{}^6C_2 q^4 p^2}_{P(X=2)} + \underbrace{{}^6C_3 q^3 p^3}_{P(x=3)} + \underbrace{{}^6C_4 q^2 p^4}_{\text{Ex 4 Succ.}}$$

$$+ \underbrace{{}^6C_5 q^1 p^5}_{P(X=5)} + \underbrace{{}^6C_6 p^6}_{P(X=6)}$$

P(x=3) Excatly three success

$$P(X=r) = P(r \text{ Success}) = {}^nC_r p^r q^{n-r}$$

दोनों Arrangement / वाले → Success or असफलता का Arrangement

① ${}^6C_0 q^6$

② ${}^6C_4 q^4 p^2$

③ $P(X=0) + P(X=1) + P(X=2)$

$= {}^6C_0 q^6 + {}^6C_1 q^5 p^1 + {}^6C_2 q^4 p^2$

(4) $P(x=1) + P(x=2) + \ldots \ldots P(x=6) = 1-q^6$

$\cancel{{}^6C_1 q^5 p^1 + {}^6C_2 q^4 p^2} + \cancel{{}^6C_3 q^3 p^3 + {}^6C_4 q^2 p^4 + {}^6C_5 q^1 p^5 +}$

or

$P(X=$

(5) $P(x=3) + P(x=4) + P(x=5) + P(x=6)$

* In Binomial Prob. distribution mean of BPD $= np$

variance of BPD $= npq$ variance $=5$

Standard Prob " " $= \sqrt{npq}$.

Q. ~~X~~ $n=10$ $P(x=7) = {}^{10}C_7\, p^7 q^3$

$n=50$ $P(x=36) = {}^{50}C_{36}\, p^{36} q^{14}$.

Q A fair coin is tossed 10 times (It is called Bernoli trials), then find the Prob. of getting $p=\frac{1}{2}$ $q=\frac{1}{2}$

(i) exactly 6 Head $= {}^{10}C_6\, p^6 q^4$

(ii) atleast 8 head $= {}^{10}C_8 p^8 q^2 + {}^{10}C_9 p^9 q^1 + {}^{10}C_{10} p^{10} q^0$.

(iii) atmost 3 head $= {}^{10}C_1 q^1 + {}^{10}C_2 q^9 p^1 + {}^{10}C_3 q^8 p^2 + {}^{10}C_4 q^7 p^3$.

$P(x=0) + P(x=1) + P(x=2) + P(x=3)$

$(q+p)^{10} =$

eg

Q. A coin is tossed as likely to head as tail in a sequence of 5 independent trial find the prob. that

$P(H) + P(T) = 1$

$2n + n = 1$

$n = \frac{1}{3}$

$P(H) = 2/3$

$P(T) = 1/3$

(i) Excatly two head occur. $= {}^5C_2 p^2 q^3$

(ii) Third head occurs on the fifth tossed.

$= \boxed{{}^5C_3 p^3 q^2}$

(2H+2T)

$= {}^4C_2 p^2 q^2 \cdot p$

Q. 100 identical pts. each following head coins with prob. p $(0<p<1)$ are tossed once. if the prob. of 50 coins showing of the Heads is = the prob. of 51 coins showing of the Heads then find value of p.

$${}^{100}C_{50} p^{50} q^{50} = {}^{100}C_{51} p^{51} q^{49}$$

$$\frac{\lfloor 100}{\lfloor 50 \lfloor 50} \cdot q = \frac{\lfloor 100}{\lfloor 51 \lfloor 49} \cdot p$$

$= \frac{51}{50} \cdot (1-p) = p$

$p\left(1 + \frac{51}{50}\right) = \frac{51}{50}$

$p = \frac{51}{101}$

Q. A travels take a step forward or backward. The prob that the step forward is 0.4. find the Prob. that at the end of 11 step he is one step away from the starting point

~~P(forward step) = 0.4.~~

~~11 0.4 prob~~

C p q
0.4

variate

$P(X = 6) + P(X = 5)$

$^{11}C_5\, p^5 q^6 + {}^{11}C_5\, p^5 q^6$

mean = 9
SD = 3/2

Q. If mean and standard deviation of binomial variate X are 9 and $\frac{3}{2}$ respectively find the Prob. that x takes the value > 1

(i.e $P(x>1)$)

mean = np.

SD = 3/2   mean = 9
n = 9
$\frac{3}{2} = (\sqrt{npq})^2$

$9 = np$. $pn = 9$

$p = \frac{9}{n} = \frac{3}{2} = \sqrt{npq}$

$q = \frac{1}{4}$ p =

$SD^2 = \left(\frac{3}{2}\right)^2 = npq$

mean = 9 = np.

$\frac{9}{4} = 9 \cdot q$ $q = \frac{1}{4}$, $p = \frac{3}{4}$ $n = 12$

$(q+p)^{12}$

$P(X>1) = P(x=2) + P(x=3) + \cdots P(x=11) + P(x=12)$

$= 1 - \{P(x=0) + P(x=1)\}$.

Q If sum of mean and variance for 6 trial is ~~2.16~~ 2.16

find the distribution

Variance = npq mean = np

$npq + np = 2.16$ $n=6$ ~~6pq~~

$np(q+1) = 2.16$ $p = \frac{2.16}{6(q+1)}$

$np = \frac{2.16}{q+1}$

$p = 1-q$

$p(q+1) = \frac{2.16}{6}$

$p(q+1) = 0.36$

$p+q=1$
$p = 1-q$

$(1-q)(1+q) = 0.36 = \frac{36}{100} = \frac{9}{25}$

$1-q^2 = \frac{9}{25}$

$q = \frac{4}{5}$ $p = \frac{1}{5}$ $n = 6$

Q. A fair die is tossed repeatedly untill 6 is obtain. Let X denote the no. of tossed Required then

p — success $= \frac{1}{6}$

$q \rightarrow$ failure $= \frac{5}{6}$

(i) find Prob that $P(X=3)$

$(p+q)^6 = {}^3C_1 q^3 + {}^3C_2 q^2 p^1 + {}^3C_3 p^3 q^3$.

$=$

$P(x=3) = qqp$

(ii) $P(x \geq 3) = qqp + qqqp + qqqqp$ ——— $= \infty$
$P(x=3) + P(x=4) + P(x=5)$

$= 1 - (p + qp)$

$ME = \phi$

$Exh =$

(3) The Conditional Prob. that $(x \geq 6)$ given that $x > 3$.

~~$(x \geq 6) = P(x=6) + P(x=7)$~~

~~$= P(x=2) + P(x=3) + P(x=4) \text{------} \infty$~~

~~$= qp + qqp + qqp \text{---}$~~

$$\frac{P(x \geq 6)}{P(x>3)} = \frac{P(A \cap B)}{P(B)} = \frac{P(x \geq 6)}{P(x>3)} =$$

$$= \frac{q^5 p + q^6 p + q^7 p + \text{------} \infty}{q^3 p + q^4 p + \text{------} \infty}$$

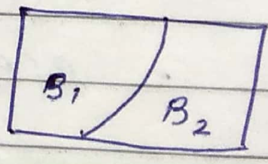
Total Probability and bayes theorem:

Let an event A be an Experiment occur with n mutually Exclusive and Exhaustive event $B_1, B_2 \text{------} B_n$ then total Probability of occurance of Event A is

<u>Two event</u>

$$P(A) = P(A \cap B_1) + P(A \cap B_2) + \text{---} P(A \cap B_n)$$

$P(B_1) + P(B_2) = 1$



$$P(A) = P(A \cap B_1) + P(A \cap B_2)$$

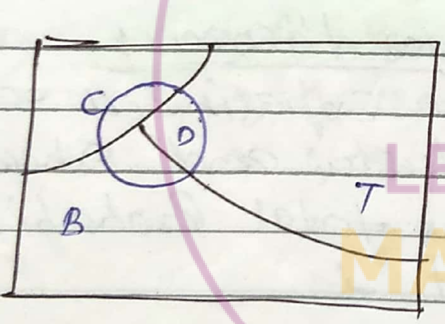
$$P(A) = P(B_1) \cdot P\left(\frac{A}{B_1}\right) + P(B_2) \cdot P\left(\frac{A}{B_2}\right)$$

* **Bayes theorem:** $P\left(\frac{B_1}{A}\right) = \dfrac{P(B_1)\left(P\left(\frac{A}{B_1}\right)\right)}{P(B_2)\,P\left(\frac{A}{B_2}\right) + P(B_2)\cdot P\left(\frac{A}{B_2}\right)}$

$$= \frac{P(B_1)\,P\left(\frac{A}{B_1}\right)}{P(B_1)\left(P\left(\frac{A}{B_1}\right) + P(B_2)\,P\left(\frac{A}{B_2}\right)\right)}$$

Three event total Probability:

* Loksabha 2019 election.



Three event total Probability

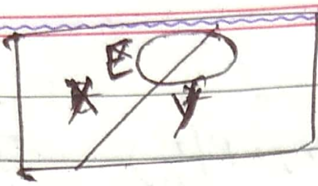
$$P(D) = P(B\cap D) + P(C\cap D) + P(T\cap D)$$

$$= P(B)\,P\left(\frac{D}{B}\right) + P(C)\,P\left(\frac{D}{C}\right) + P(T)\cdot P\left(\frac{D}{T}\right)$$

Bayes theorem!

$$\Rightarrow P\left(\frac{B}{D}\right) = \frac{P(B)\,P\left(\frac{D}{B}\right)}{P(B)\,P\left(\frac{D}{B}\right) + P(C)\cdot P\left(\frac{D}{C}\right) + P(T)\,P\left(\frac{D}{T}\right)}$$

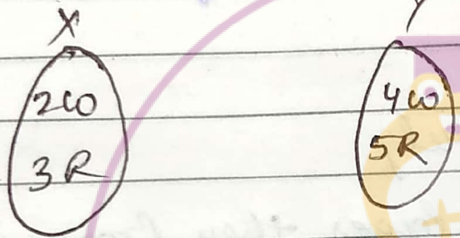
Que;



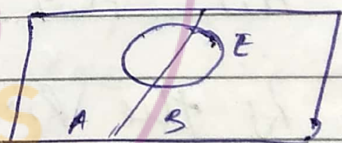
(1) $P(E) = P(E \cap X) + P(E \cap Y) = P(x) \cdot P\left(\frac{E}{x}\right) + P(y)\, P\left(\frac{E}{y}\right)$.

(2) $$P\left(\frac{y}{E}\right) = \frac{P(y)\, P\left(\frac{E}{y}\right)}{P(y)\, P\left(\frac{E}{y}\right) + P(x)\, P\left(\frac{E}{x}\right)}$$

Q.



2 Bags are shown in the fig. 1 Ball is drawn from the Bag at Random then what is the Prob that it is Red.



$P(E) = P(E \cap A) + P(E \cap B)$

$= P(A)\, P\left(\frac{E}{A}\right) + P(B)\, P\left(\frac{E}{B}\right)$

E લાલ ચૂંટાય

A = X Bag select

B = Y Bag select

F = white ચૂંટાય

$= \frac{1}{2} \cdot \frac{3}{5} + \frac{1}{2} \cdot \frac{5}{9}$ Ans

Q. In above situation 1 Ball is drawn from a Bag at random and found to be ~~Red~~ white then find the Prob. that it was drawn from Bag Y.

$$P(E) = P\left(\frac{B.Y}{W}\right) = \frac{P(y)\, P\left(\frac{W}{y}\right)}{P(y)\, P\left(\frac{W}{y}\right) + P(x)\, P\left(\frac{W}{x}\right)} = \frac{\frac{1}{2} \cdot \frac{4}{9}}{\frac{1}{2} \cdot \frac{4}{9} + \frac{1}{2}\, \frac{2}{5}}$$

H.w Part 5 - 8, 9
Jee Adv. ⇒ 4-5, 12-13 Solve in fair copy.

Am $P\left(\frac{B}{F}\right) = \frac{P(B)\,P\left(\frac{F}{B}\right)}{P(B)\cdot P\left(\frac{F}{B}\right) + P(A)\cdot P\left(\frac{F}{A}\right)} = \frac{\frac{1}{2}\cdot\frac{4}{9}}{\frac{1}{2}\cdot\frac{4}{9} + \frac{1}{2}\cdot\frac{2}{5}}$

Q. 3 Political Parties C, B, T are Contesting for Loksabha election with development as a core issue. the Prob. of C B T Parties meaning R electio

$C = \frac{1}{3}$ 0.3

$B = 4/9$ 0.7

$T = 2/9$ 0.1 respectively

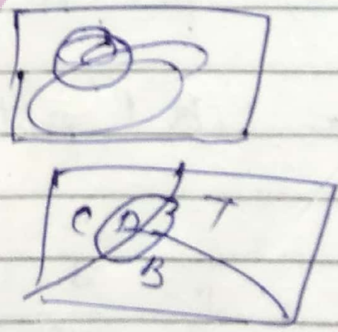
if ~~Con~~ C comes to the Power then Probability of during development occur in the Country is 0.3. Corresponding probabilities for B and T are 0.7 and 0.1 respecti'

(i) what is the Probability that development will occur

~~C ⇒ Congress~~

$P\left(\frac{C}{D}\right) = \frac{P(C)\,\cancel{P\left(\frac{D}{C}\right)}}{P(C)\,\cancel{P\left(\frac{D}{C}\right) + P(B)\,P\left(\frac{D}{B}\right) + P(T)\,P\left(\frac{D}{T}\right)}}$

B ⇒ ~~Cong~~ - BJP Par



P(C) = Congress Power

P(D) = Development in the Countries

T =

= $\frac{1}{3}$.

$P(D) = P(B)\,P\left(\frac{D}{B}\right) + P(C)\,P\left(\frac{D}{B}\right) + P(T)\cdot P\left(\frac{D}{T}\right)$

$= \frac{4}{9}\cdot(0.7) + \frac{1}{3}(0.3) + \frac{2}{9}(0.1)$

Q(ii) if Development occur through out the country then what is P that it is done by 3rd T

$$P\left(\frac{T}{D}\right) = \frac{P(T)\,P\left(\frac{D}{T}\right)}{P(T)\,P\left(\frac{D}{T}\right) + P(B)\,P\left(\frac{D}{B}\right) + P(C)\,P\left(\frac{D}{C}\right)}$$

$$= \frac{\frac{2}{9} \times (0.1)}{\frac{4}{9}(0.7) + \frac{1}{3}(0.3) + \frac{2}{9}(0.1)}$$

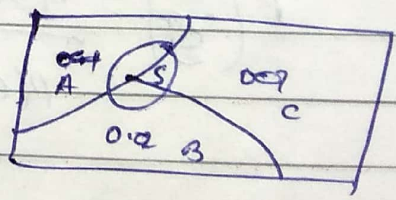
Q. A Gulantal stat that he will succes in JEE exam with 80% chance if he studie 10h per day, with 60% if he study 7h/day and 40% chance if he study 4h/day. Gulantal further believe that hee will study 10h, 7h, 4h P/day with P 0.1, 0.2, 0.7 res.

(i) what is the chance that Gul is succesm

A → 10h study

B = 7h study

C : 4h study



$$P(S) = P(A)\,P\left(\frac{S}{A}\right) + P(B)\,P\left(\frac{S}{B}\right) + P(C)\left(\frac{S}{C}\right)$$

$$= (0.1)(.8) + (0.2)(0.6) \quad (0.7)(.4)$$

(ii) Given that G su what is the chance he study 7H.

$$P\left(\frac{B}{S}\right) = \frac{P(B)\,P\left(\frac{S}{B}\right)}{P(A)\,P\left(\frac{S}{A}\right) + P(B)\,P\left(\frac{S}{B}\right) + P(C)\,P\left(\frac{S}{C}\right)} = \frac{(0.2)(0.6)}{}$$

Q. A ~~d~~ lady have 10 Point in her purse, 8 are there are normal Coin ~~are~~ 1 DH and 1 DT

She randomly draw a coin and tossed it 5 times.

8NC, 1DH, 1DT

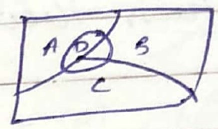
The coin was found was for Head for all the cases

find the Prob. that coin was Double head.

A → Normal coin

B → DH coin

C → DT coin



D = all Head आया

$\cancel{P\left(\frac{D}{DH}\right) = P(A)\cdot P(}$

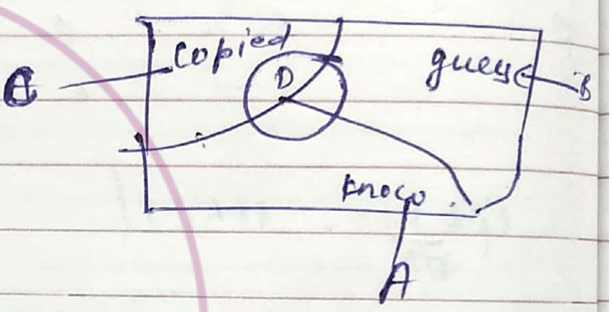
$$P\left(\frac{DH}{\text{पाँचों Head आया}}\right) = \frac{P(DH)\,P\left(\frac{\text{पाँचों Head आया}}{DH}\right)}{P(DH)\,P\left(\frac{\text{पाँचों Head आया}}{DH}\right) + P(DT)\,P\left(\frac{\text{पाँचों Head}}{DT}\right) + P(NC)\,P\left(\frac{\text{पाँचों Head}}{NC}\right)}$$

$$\boxed{= \frac{\frac{1}{10}\left(\frac{5}{1/10}\right)}{\frac{1}{10}\left(\frac{5}{1/10}\right) + \left(\frac{1}{10}\right)\left(\frac{1}{1/10}\right) + \frac{8}{10}\cdot\left(\frac{1}{1/10}\right)}}$$

$$= \frac{\frac{1}{10}\cdot(1)}{\frac{1}{10}\cdot 1 + \frac{1}{10}\cdot 0 + \frac{8}{10}\cdot\left(\frac{1}{2}\right)^5}$$

Ans.

Q. In a test An Examinate either ~~Case~~ Guess or Copies or Not know to the mul. C Q. with 4 choich and only one correct. The P. that he makes a guess is $\frac{1}{3}$ P(Copies the Ans) = $\frac{1}{6}$. the P. that his Ans is Correct given that He copied it = $\frac{1}{8}$. Find the P. that he knows the Ans to the Que given that he Correctly Answered.



P(~~he give~~

$$P\left(\frac{\text{know the } \cancel{D\ \text{सही}}\ \text{Ans}}{\text{Ans सही आया हो}}\right) :$$

for Q

$$= \frac{P(A)\ P\left(\frac{\text{सही Ans आया}}{A = \text{know the Ans}}\right)}{P(A)\ P\left(\frac{\text{सही}}{A}\right) + P(B)\ P\left(\frac{\text{सही}}{B}\right) + P(C)\ P\left(\frac{\text{सही}}{C}\right)}$$

Know

$$= \frac{\frac{1}{2}(1)}{\frac{1}{2}(1) + \frac{1}{3}\left(\frac{1}{4}\right) + \frac{1}{6}\left(\frac{1}{8}\right)}$$

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