

Probability Assignment

Date → 27/02/20

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

Q-1

{ Two dice rolled at once }

$= P(\text{sum of No. being even}) \times P(\text{one of the die shows 6})$

$$= \frac{18}{36} \times \frac{1}{6}$$

$$= \frac{18}{36}$$

Ans

Q-2 { Two dice rolled at once }

$P(\text{sum of Numbers being less than 7})$

$$= \frac{15}{36}$$

Ans

Q-3 A fair Coin tossed three times

Total Number of fav outcomes = $8 = 2^3$

Given that observed atleast one head ✓

$$P(\text{at least two head}) = \frac{4}{7}$$

Ans

Q-4 A & B Married couple with two kids.
one of them is Girl.

f.o = {GB, GG, BG}

$$P(\text{other Being Girl}) = \frac{1}{3}$$

Ans

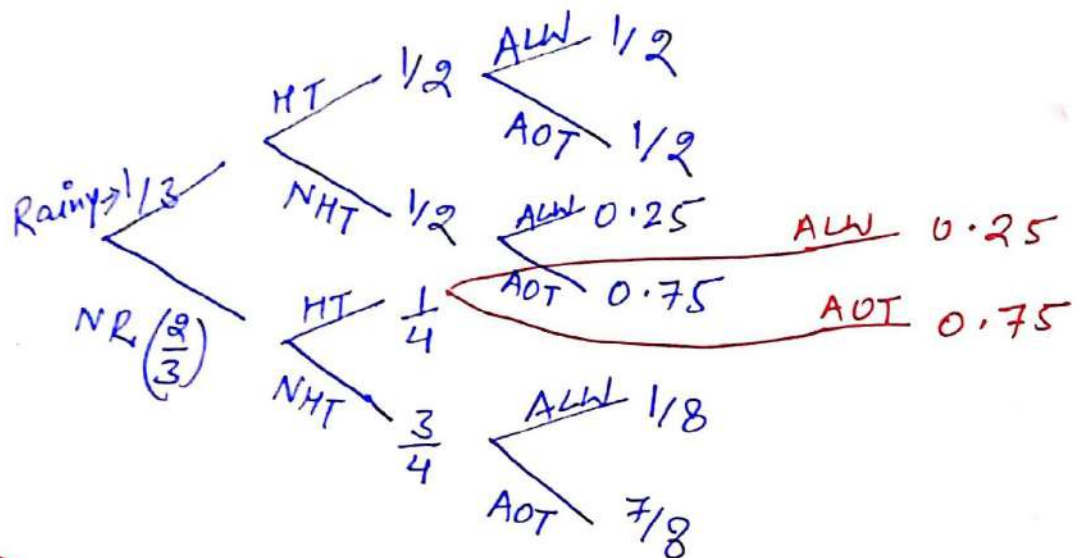
Conditional, Joint and Marginal Prob

9.5

Rainy $\rightarrow \frac{1}{3}$ of Days $-NR = \frac{2}{3}$

$$P(\text{Heavy Traffic/Rainy}) = \frac{1}{2}$$

$$P(\text{Heavy Traffic/Not Rainy}) = \frac{1}{4}$$



② prob Not Raining and there is heavy traffic & I am not late?

$$= \frac{2}{3} \times \frac{1}{4} \times 0.75$$

$$= 0.66 \times 0.25 \times 0.75$$

$$= 0.125 \text{ Ans}$$

⑥ Prob (I am late)

Marginal Prob

$$= \frac{1}{3} \times \frac{1}{2} \times \frac{1}{2} + \frac{1}{3} \times \frac{1}{2} \times 0.25 +$$

$$\frac{2}{3} \times \frac{1}{4} \times 0.25 + \frac{2}{3} \times \frac{3}{4} \times \frac{1}{8}$$

$$= \frac{1}{12} + \frac{0.25}{6} + \frac{0.50}{12} + \frac{6}{12 \times 8 \times 2}$$

$$= \frac{1}{12} + \frac{0.25}{6} + \frac{0.50}{12} + \frac{1}{16}$$

$$= 0.083 + 0.041 + 0.0416 + 0.0625$$

$$= 0.2281 \leftarrow \text{Ans}$$

then that I arrived late at work = $P(\text{Rainy} / \text{LAW})$

Conditional Prob

Q.5
C

$$P(\text{Rainy} / \text{LAW}) = \frac{P(\text{LAW} \cap \text{Rainy})}{P(\text{LAW})}$$

$$= P(\text{LAW}) \cap P(\text{Rainy})$$

$$= \frac{1}{3} \times \frac{1}{2} \times \frac{1}{2} + \frac{1}{3} \times \frac{1}{2} \times 0.25$$

$$= \frac{1}{12} + \frac{0.25}{6}$$

$$= \frac{1}{12} + \frac{25}{600}$$

$$= \frac{1}{12} + \frac{1}{6 \times 4}$$

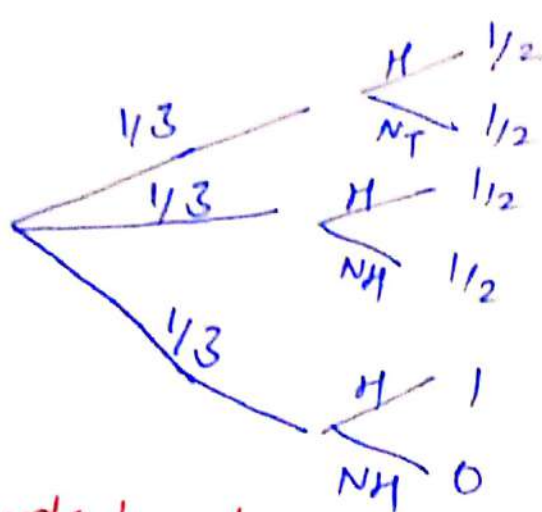
$$= \frac{1}{12} \left[1 + \frac{1}{2} \right] \Rightarrow \frac{1}{12} \left(\frac{3}{2} \right)$$

$$= \frac{3}{24}$$

Ans.

$$P(\text{LAW}) = \frac{1}{3} \times \frac{1}{2} + \frac{1}{3} \times 1$$

Q.6
sol -



Q → (a) lands heads up

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

$$= \frac{2}{6} + \frac{1}{3}$$

$$= \frac{2+2}{6}$$

$$= \frac{4}{6} \quad \left(\frac{2}{3} \right) \text{ Ans}$$

(b)

$$P(F/H) = ?$$

$$P(F/H) = \frac{P(F \cap H)}{P(H)}$$

$$= \frac{P(F) \times P(H/F)}{P(H)}$$

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

$$= \frac{\frac{1}{3}}{\frac{2}{6} + \frac{1}{3}}, \quad \left[\frac{\frac{1}{3}}{\frac{2}{3}} \right]$$

$$= \frac{1}{2} \text{ Ans}$$



70% Coffee
 $\frac{70}{100} = \left(\frac{7}{10}\right)$

40% cake
 $\frac{40}{100} = \left(\frac{2}{5}\right)$

Cake and coffee
 $20\% = \frac{20}{100} \left(\frac{1}{5}\right)$

Randomly chose Customer
 purchase Cake

$P(\text{purchase a coffee / cake Purchased})$

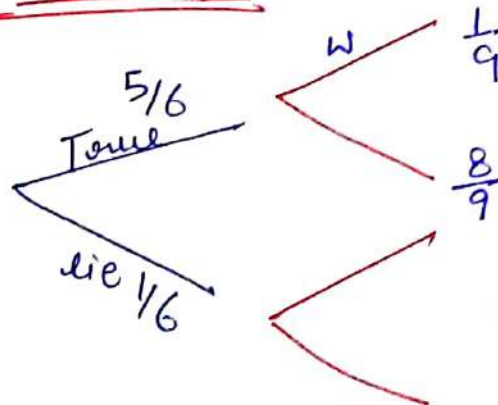
$= \frac{P(\text{purch} \cap \text{cake})}{P(\text{cake purch})}$

$= \frac{1/5}{2/5}$

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

Q.8 -
Ans

$P(T) = \frac{5}{6}$
 $P(L) = \frac{1}{6}$
 $P(B) = \frac{8}{9}$
 $P(W) = \frac{1}{9}$



$P(W) = \frac{1}{9} \times \frac{5}{6}$

$= \frac{5}{54}$ Ans

$P(\text{White Ball Drawn / Truth})$

$= \frac{P(W \cap T)}{P(\text{Truth})}$
 $= \frac{P(W) \times P(W|T)}{P(T) P(W|T) + 1}$

$= \frac{1/9}{5/6}$

$= \frac{\frac{1}{9} \times \frac{5}{6}}{\frac{5}{6} \times \frac{1}{9} + \frac{5}{6} \times \frac{8}{9}}$
 $= \frac{\frac{5}{54}}{\frac{5+40}{54}}$

Ans $= \frac{5}{45}$ Ans

Q.9
Ans →

T	4/5
L	1/5

$$\left(\frac{1}{6}\right)$$

Conditional Prob

$$P(\text{Actually } 6 / \text{Truth}) = \frac{P(6 \cap T)}{P(T)}$$

$$P(6/T) = \frac{P(6) \times P(T/6)}{P(T)}$$

$$= \frac{\frac{1}{6} \times \frac{4}{5}}{\frac{1}{6} \times \frac{4}{5} + \frac{1}{5} \times \frac{5}{6}}$$

$$= \frac{\frac{4}{30}}{\frac{4}{30} + \frac{5}{30}} = \frac{\frac{4}{30}}{\frac{9}{30}} = \frac{4}{9}$$

$$\frac{4}{9} \text{ Ans}$$

Q.10

Ans ⇒ 40% M

$$P(M) = \frac{40}{100}, \quad P(M \cap S) = \frac{4}{10}$$

$$P(S) = \frac{60}{100}, \quad P(M) = \frac{6}{10}$$

Conditional Prob

$$P(S/M) = \frac{P(M \cap S)}{P(M)}$$

$$= \frac{\frac{40}{100}}{\frac{60}{100}}$$

$$\frac{4}{6} \left[\frac{2}{3} \right] \text{ Ans}$$

Q.11

(a) Joint Prob

$$\Rightarrow \frac{P(M) \times P(C/M)}{P(M \cap C)}$$

$$= \frac{364 \times 19}{5100}$$

$$= \frac{19 \times 3}{5} = \frac{57}{5}$$

$$\frac{19}{100} \text{ Ans}$$

$$\textcircled{b} \quad \underline{P(M)} = \frac{60}{100} = \frac{6}{10} = \left(\frac{3}{5}\right) \quad \underline{\text{Ans}}$$

\textcircled{c} Marginal or whole

$$P(\text{Being a Graduate}) = \frac{31}{100} = \left(0.31\right) \quad \underline{\text{Ans}}$$

$$\textcircled{d} \quad \underline{P(F/PG)} = \frac{P(PG \cap F)}{P(PG)} = \cancel{P(PG)} \times \cancel{P(F/PG)}$$

Conditional Prob = $\frac{P(PG)}{\frac{28}{69} \frac{100}{100}}$

$$\frac{P(PG \cap F)}{P(PG)} = \frac{\cancel{P(PG)} \times \cancel{P(F/PG)}}{\cancel{P(PG)}}$$

$$\left(\frac{28}{69}\right) \quad \underline{\underline{\text{Ans}}}$$