Probability

Q1.

Prob. ~~of getting~~ for sum of no. being even

Events can be = (1,1), (1,3), (1,5), (2,2), (2,4), (2,6), (3,1)
(3,3), (3,5), (4,4), (4,2), (4,6), (5,1)
(5,3), (5,5), (6,2), (6,4), (6,6)

= 18

$P = 18/36 = 1/2$

one of the dice shows Six = $6/36 = 1/6$

Q.2 Prob. ~~less than~~ for sum of no. less than 7

$= \frac{9}{36} = \frac{1}{4}$

Q.3. H/T H/T H/T

A = at least 2 heads
B = at least 1 head

P(at least 2 head / at least 1 head)

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

$= \frac{P(2H \cap 1H)}{P(1H)}$

$= \frac{P(2H)}{P(1H)} \Rightarrow \frac{4/8}{7/8} = 4/7$

H H H ✓
H H T ✓
H T H ✓
T H H ✓
T T T
T T H
T H T
H H T ✓

Q.4 Possibi. of both kids

$= (G,G), (B,B), (G,B), (B,G)$

$P = (\text{Both G} \mid \text{one girl}) = \dfrac{P(\text{Both G})}{P(\text{one girl})}$

$P(BG) = (.5)\times(.5) = .25$

$P(\text{one gr}) = 1 - (\text{no. girl})$.

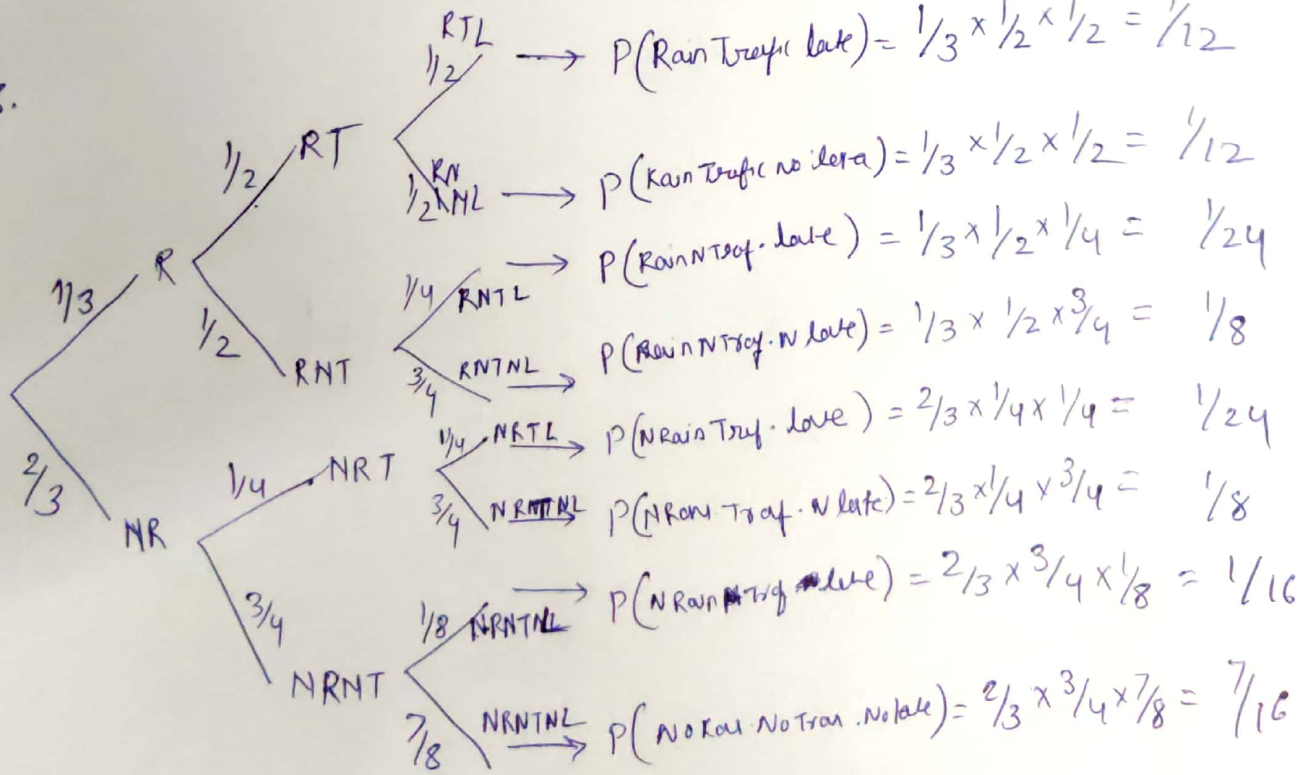
$P(\text{No girl}) = P(B.B) = .5 \times .5 = .25$

$P(\text{one girl}) = 1 - .25 = .75$

$\Rightarrow P(B.G \mid \text{one girl}) = \dfrac{.25}{.75} = 1/3$

Chances of second girl is $1/3$

Q.5.



(a) $P(NR \cap T \cap NL)$

$P(NR \cap T \cap NL) = P(NR)\, P(T|NR)\, P(NL|NR \cap T)$

$= 2/3 \times 1/4 \times 3/4$

$= \underline{1/8}$

(b) Total of late $= P(L) = P(RTL) + P(RNTL) + P(NRTL) + P(NRNTL)$

$= 1/12 + 1/24 + 1/24 + 1/16$

$= 11/48$

(C) Late + Rain $= P(R|L) = \dfrac{P(R \cap L)}{P(L)}$

where $P(L) = 11/48$

$P(R \cap L) = P(RTL) + P(RNTL)$

$= 1/12 + 1/24$

$= 1/8$

$\therefore P(R|L) = 1/8 \div 11/48 = 6/11$

Q.7

70% coffee · 7 (A)
40% cake · 4 (B)
20% both · 2 (A ∩ B)

$$\therefore P(A|B) = \frac{P(A \cap B)}{P(B)}$$

$$= \frac{\cancel{.2} \; 1}{\cancel{.4} \; 2}$$

1/2 of the customs has also purchased cup of coffee.

Q.8. $\omega \Rightarrow$ White ball

$T \Rightarrow$ Tenth he saw

$P(\omega) = 1/9$, $P\left(\frac{T}{\omega}\right) = 5/6$

$P(\omega_1) = 1 - P(\omega)$

$= 1 - 1/9 = 8/9$

, $P\left(\frac{T}{\omega_1}\right) = 1 - 5/6 = 1/6$

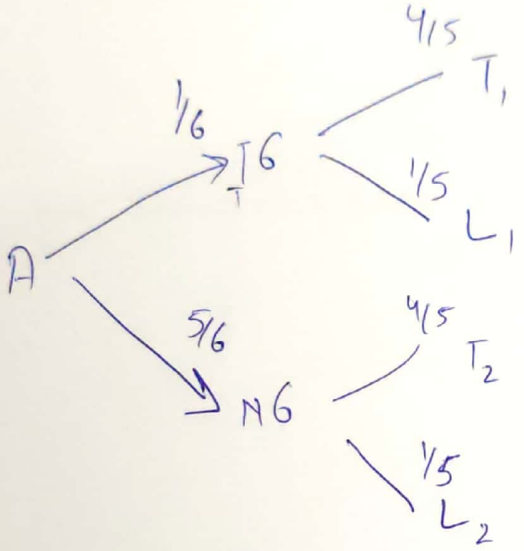
$$P\left(\frac{\omega}{T}\right) = \frac{P\left(\frac{T}{\omega}\right) \times P(\omega)}{P\left(\frac{T}{\omega}\right) \times P(\omega) + P\left(\frac{T}{\omega_1}\right) \times P(\omega_1)}$$

$$= \frac{5}{6} \times \frac{1}{9} \Big/ 5/6 \times 1/9 + 1/6 \times 8/9$$

$$= \frac{5/54}{\frac{5+8}{54}} = 5/13$$

The probability of white ball drawn is $5/13$

Q. 9



$$P_1 = P(T_0) \times (P_1)$$

$$= 1/6 \times 4/5$$

$$= 2/15$$

$$P_2 = P(NT) \times P(L_2)$$

$$= 5/6 \times 1/5 = 1/6$$

$$P = \frac{P_1}{P_1 + P_2} = \frac{2/15}{2/15 + 1/6} = 4/9$$

Q. 10

$$P(A) = 60/100$$

$$P(A \cap B) = 4/100$$

$$P(B/A) = \frac{P(A \cap B)}{P(A)} = \frac{40/100}{60/100} = 4/6 = 2/3 = .66$$

.66

Q.

Q14

Let $P(S)$ be Swan flu $P(S_1)$ Not having SF

$P(T)$ is +ve test

$$\text{So } P(S|T) \Rightarrow \frac{P(T|S)\,P(S)}{P(T)}$$

$$P(S|T) \Rightarrow \frac{P(T|S)\,P(S)}{P(T|S)\,P(S) + P(T|S_1)\,P(S_1)}$$

$P(S) = .0001$

$\therefore P(S_1) = .9999$

$P(T|S) = 1$ (1 has swan flu)

$P(T|S_1) = .01$ (1% is NC test)

$$P(S|T) = \frac{1 \times .0001}{1 \times .0001 + .01 \times .9999}$$