

- ① Two dice are rolled at once. find out the probability for sum of numbers being even and one of the die shows 6.

1 <sup>st</sup> die	2 <sup>nd</sup> die	
1	6	
2	6	5
3	6	6 x 6
4	6	
5	6	$= \frac{5}{36} = \frac{1}{6} //$
6	6	
6	1	
6	2	
6	3	
6	4	
6	5	
6	6	

- ② Two dice are rolled at once. find out the probability for sum of numbers being less than 7.

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

$$\frac{15}{6 \times 6} = \frac{15}{36} = \frac{5}{12} //$$

⑤ You test a fair coin 3 times given that you have observed atleast one Head, what is the prob. that you observe atleast 2 Heads.

1<sup>st</sup> coin    2<sup>nd</sup> coin    3<sup>rd</sup> coin

H	H	T	①
H	T	H	②
H	H	H	③
T	H	H	④
T	H	T	
T	T	T	
T	T	H	
H	T	T	

Total no. of possibilities =  $2 \times 2 \times 2 = 8$

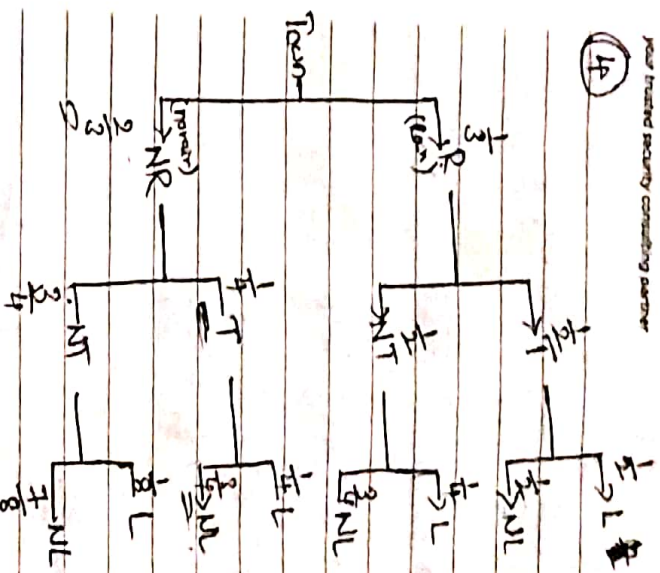
$$P(1 \text{ head}) = \frac{3}{8}$$

$$P(2 \text{ heads}) = \frac{3}{8}$$

$$P(A|B) = P(2 \text{ heads} / 1 \text{ head}) = \frac{\frac{3}{8}}{\frac{3}{8}}$$

$$= \frac{3}{3} //$$

④



$$P(NR-T-NL) = ? \leftarrow \text{prob of it not raining}$$

$$= \frac{1}{8} \times \frac{1}{4} \times \frac{1}{8} \text{ traffic and rain not here?}$$

$$= \frac{1}{8} //$$



Date: \_\_\_\_\_

$$\frac{1}{2} \times \frac{3}{2} \times 3 = \frac{9}{4}$$

b) what is the probability that Jim late?

$$P(R, T, L) = \frac{1}{3} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{12}$$

$$P(R, T, L) = \frac{2}{3} \times \frac{1}{4} \times \frac{1}{2} = \frac{1}{12}$$

$$P(R, T, L) = \frac{2}{3} \times \frac{3}{4} \times \frac{1}{2} = \frac{1}{4}$$

$$P(R, T, L) = \frac{1}{3} \times \frac{1}{2} \times \frac{1}{4} = \frac{1}{24}$$

~~$$P(R, T, L) = \frac{1}{12} \times \frac{3}{4}$$~~

$$P(\text{late}) = \frac{1}{12} + \frac{1}{24} + \frac{1}{12} + \frac{1}{24}$$

$$= \frac{1}{12} + \frac{1}{24} + \frac{1}{12} + \frac{1}{24}$$

$$= \frac{11}{48}$$

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

Date: \_\_\_\_\_

c) Given that I arrived late at work, what is the probability that it rained that day?

$$P(R|L) = \frac{P(R, L)}{P(L)}$$

$$P(R, L) = P(R, T, L) + P(R, NT, L)$$

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

$$= \frac{1}{12} + \frac{1}{24} = \frac{2}{24} + \frac{1}{24}$$

$$= \frac{3}{24} = \frac{1}{8}$$

$$P(\text{late}) = \frac{11}{48}$$

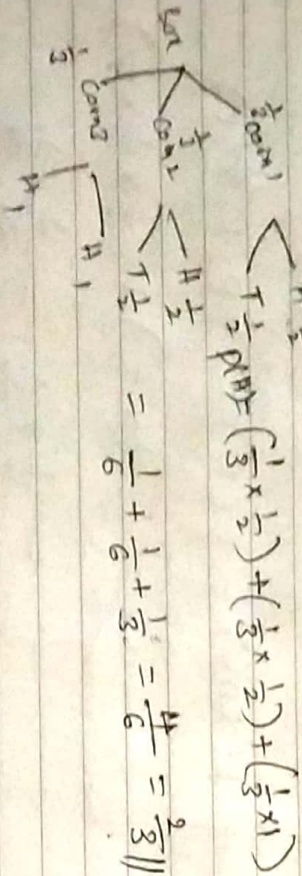
$$P(R|L) = \frac{\frac{1}{8}}{\frac{11}{48}} = \frac{1}{8} \times \frac{48}{11}$$

$$= \frac{6}{11}$$



- 5) A box contains 3 coins: two regular coins and one fair 8-headed coin ( $P(\text{Heads}) = 1/8$ ), you pick a coin at random and toss it.

(a) what is the prob that it lands head up?



- (b) you pick a coin at random and toss it and get heads. what is the prob that it's the two-headed coin?

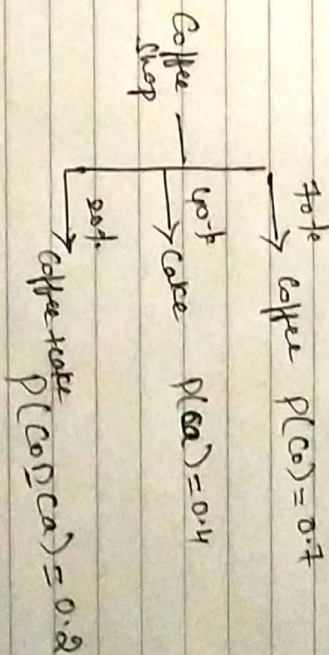
$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

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

- 6) Suppose that, of all customers at a coffee shop
- (a) 70% purchase coffee

- (b) 40% purchase cake
- 80% purchase both coffee and cake

Given that randomly chosen customer has purchased a piece of cake, what is the prob that he/she has also purchased a cup of coffee?



$$P(Co|Ca) = \frac{P(Co \cap Ca)}{P(Ca)}$$

$$= \frac{0.2}{0.14} = \frac{1}{2}$$