M /T /W /T /F /S /SU

Date.....

(1) Total probability of 2 dice $= 6^2 = 6 \times 6 = 36$

Sum of even numbers and one of dice = 6 ways,

(2,6), (6,2)

(4,6), (6,4)

(6,6) = 5

$P(E) = \frac{5}{36}$

(2) Total probability = 36

Sum of numbers being less than 7. is,

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

(2,1), (2,3) (2,4) (2,2) = 15

(3,1), (3,2), (3,3)

(4,1), (4,2)

(5,1) $P(E) = \frac{15}{36} = \frac{5}{12}$

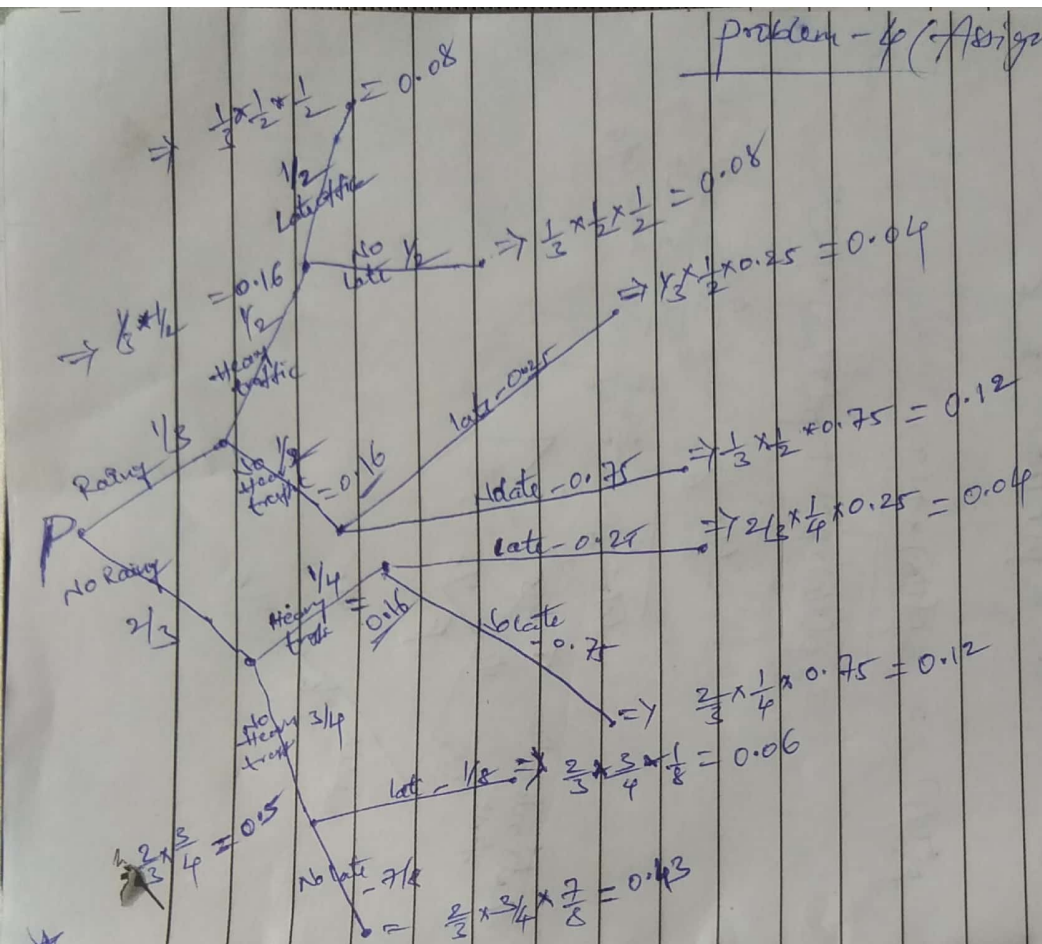
(3) Total probability $= 2^3 = 2 \times 2 \times 2 = 8$

Given that, $P(A/B) = 7/8$ = atleast one head

$P(A \cap B)$ = atleast 2 heads $= 4/8$

$P(A/B) = \frac{P(A \cap B)}{P(B)} \Rightarrow P(B) = \frac{P(A \cap B)}{P(A/B)} = \frac{4/8}{7/8} = \frac{4}{7}$ //

Problem - 4 (Assignment)



(a) $P(\text{no raining} \wedge \text{Heavy traffic} \wedge \text{no late}) = 0.12$

(b) $P(\text{late}) = 0.08 + 0.04 + 0.04 + 0.06 = 0.22$

(c) $P(\text{rained} / \text{late work}) = \frac{P(\text{rained} \wedge \text{late work})}{P(\text{late work})} = \frac{0.08+0.04}{0.22} = 0.54$ (need to sum 2 late work)

0.08
0.04
0.12

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(5) 2 regular coins, 1 fake two-headed coin ($P(H=1)$)

→ picking regular coin = 2/3 (2 fair coins out of total 3 coins)

→ picking fake coin = 1/3

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(a) $P(H)$?

$P(\text{regular coin} \cap \text{head}) = \frac{2}{3} * \frac{1}{2}$

$P(\text{fake coin and head}) = \frac{1}{3} * 1$

$P(\text{Total heads}) = \frac{2}{3} * \frac{1}{2} + \frac{1}{3} * 1 = \frac{1}{3} + \frac{1}{3} = 2/3$

(b) probability of two-headed coin

Bayes theorem

$P(\text{2 headed coin} / \text{head}) = 1$ and $P(\text{2 headed coin pick}) = 1/3$

$P(\text{2-headed coin} / \text{head}) = \frac{P(\text{head} / \text{2headed coin}) * P(\text{2 headed coin pick})}{P(\text{head}) \rightarrow \text{from (a)}}$

$= \frac{1 * \frac{1}{3}}{2/3} = \frac{1}{3} \times \frac{3}{2} = 1/2$

(6) $P(A) = P(\text{coffee}) = 70/100 = 0.70$

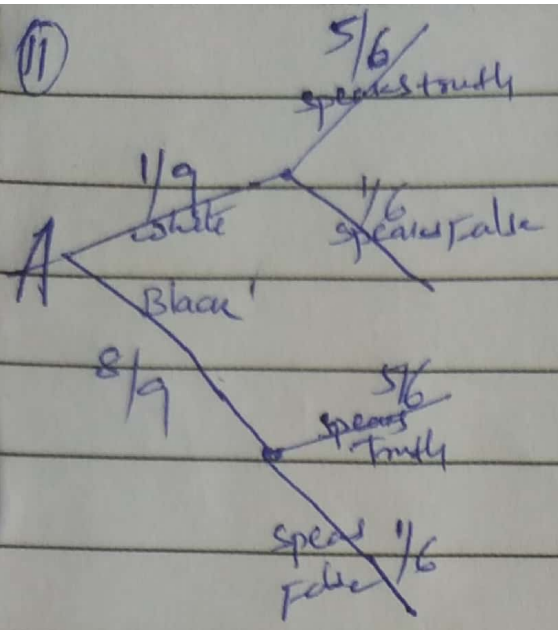
$P(B) = P(\text{cake}) = 40/100 = 0.40$

$P(A \cap B) = P(\text{coffee and cake}) = \frac{20}{100} = 0.20$

Given that,

$P(A/B) = \frac{P(A \cap B)}{P(B)} = \frac{0.20}{0.40} = \frac{20}{40} = \frac{1}{2} = 0.5$

(11)



$P(\text{speaks truth and white}) = P(A \cap B) = \frac{5}{6} * \frac{1}{9}$

$P(\text{speak truth / white}) * P(\text{white})$

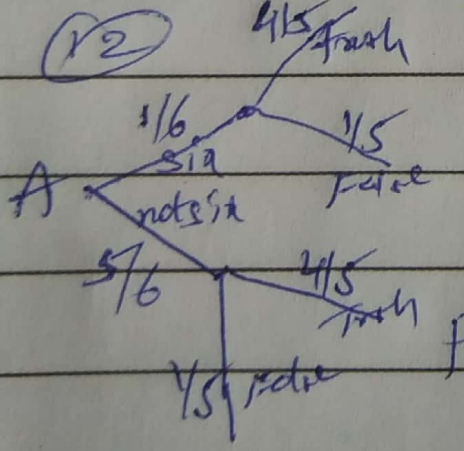
$P(\text{white drawn / A spoke truth})$

$= \dfrac{P(\text{truth / white}) * P(\text{white})}{P(\text{spoke truth})}$

A speaks truth and white **or** A didn't speak truth and not white

$= \dfrac{\frac{5}{6} * \frac{1}{9}}{\left(\frac{5}{6} * \frac{1}{9}\right) + \left(\frac{8}{9} * \frac{1}{6}\right)} = \dfrac{5}{5+8} = \dfrac{5}{13}$ //

(12)



$P(\text{Truth / Six}) * P(\text{Six}) = P(\text{A speaks Truth and six})$

$= P(A \cap B) = 1/6 * 4/5$

$P(\text{Actually six / spoke Truth}) = \dfrac{\frac{1}{6} * \frac{4}{5}}{\left(\frac{1}{6} * \frac{4}{5}\right) + \left(\frac{5}{6} * \frac{1}{8}\right)}$

$= \dfrac{4}{4+5} = \dfrac{4}{9}$ //