6) i) $p(H) = ?$ - Marginal probability (Whole prob).

$= p(H \cap A) + p(H \cap B)$

Where A = regular coin

B = fake coin

$= p(A) * P(H/A) + p(B) * P(H/B)$

$= (2/3 * 1/2) + 1/3 * 1$

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

ii) $p(B/H)$ => We know $p(H/B)$

↳ Bayes theorem

$p(B/H) = \frac{p(H/B) * p(B)}{p(H)} = \frac{1 * 1/3}{2/3}$

$= 1/2$

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7) $p(c) = 0.7 = p(\text{coffee})$

$p(\text{cake}) = 0.4$

$p(\text{coffee} \wedge \text{cake}) = 0.2$

$p(\text{coffee}) \quad p(\frac{\text{coffee}}{\text{cake}}) = ?$

$p(\text{coffee} \wedge \text{cake}) = p(\frac{\text{coffee}}{\text{cake}}) * p(\text{cake})$

$\frac{0.2}{0.4} = \frac{1}{2}$

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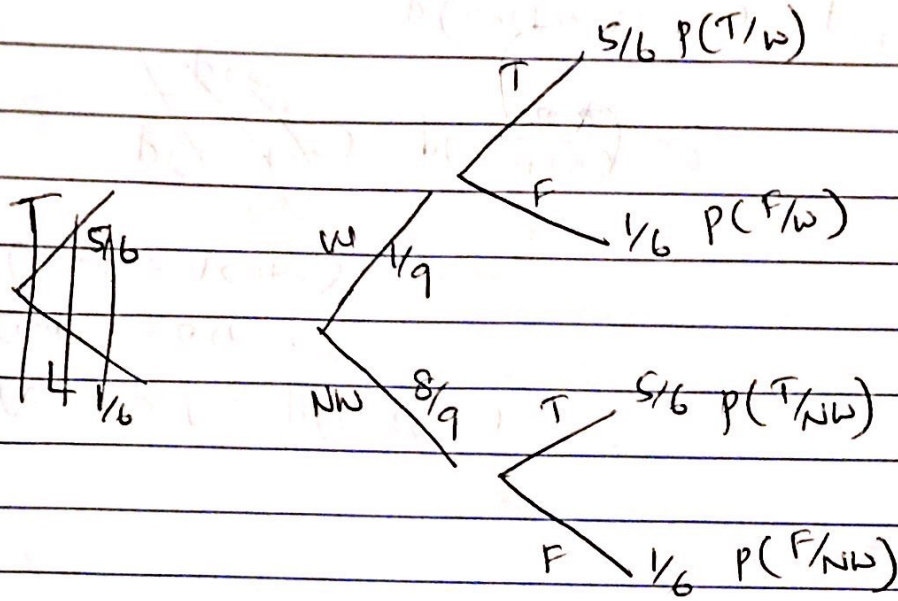
*

8)



$P(W) = ?$

$P(W/T)$ $\quad P(W/NW) = P\left[\frac{W}{T}\right]$

$P(W) = P(W \cap T) + P(W \cap F)$

$= P(W) * P(T/W) + P(W) * P(F/W)$

$P(W/T) = \frac{P(T/W) * P(W)}{P(T)}$

$P(T) = (P(T/W) * P(W)) + P(T/NW) * P(NW)$

$= (5/6 * 1/9) + 5/6 * 8/9$

$P(T) = 5/6 \Rightarrow P(W/T) = \frac{5/6 * 1/9}{5/6} = 1/9$

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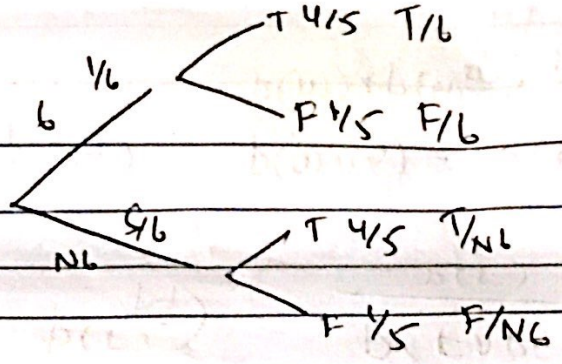
*9)



$P\left(\frac{6}{AG}\right) = P(6/T)$

$\frac{P(6)}{P(6) + P(NG)}$

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

$$P(T) = P(T/6) * P(6) + P(T/NG) * P(NG)$$

$$= \left(\frac{4}{5} * \frac{1}{6}\right) + \left(\frac{4}{5} * \frac{5}{6}\right) = \frac{4}{5}\left(\frac{1}{6} + \frac{5}{6}\right)$$

$$= \frac{4}{5}$$

$$P(6/T) = \frac{\frac{4}{5} * \frac{1}{6}}{\frac{4}{5}} = \frac{1}{6}$$

$$P(6/F) = \frac{P(F/6) * P(6)}{P(F)}$$

$$P(F) = P(F/6) * P(6) + P(F/NG) * P(NG)$$

$$= \frac{1}{5} * \frac{1}{6} + \frac{1}{5} * \frac{5}{6}$$

$$= \frac{1}{5}(1) = \frac{1}{5}$$

$$P(6/F) = \frac{\frac{1}{5} * \frac{1}{6}}{\frac{1}{5}} = \frac{1}{6}$$

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*10) $p(m \cap s) = 0.4$

$p(m) = 0.6$

$p(S/m) = ?$

$$\frac{p(m) \times p(S/m)}{p\!\!\!/} = p(m \cap s)$$

$= p(S/m) = p(m \cap s) * p(m)$

$= 0.4 * 0.6$

$= 0.24$

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11)*

	Graduates		post Graduates		total	
Male	19	0.19	41	0.41	60	0.6
Females	12	0.12	28	0.28	40	0.4
total	31	0.31	69	0.69	100	

a) $P(M \cap G) = P(M) * P(G/M)$ Male & Graduate

Joint probability $= 0.6 * 0.19$ 0.19

$=$

b) $P(M) = 0.6$

c) $P(G) = 0.31$ – Marginal probability

d) $P(F/PG) = P(F \cap PG) * P(PG)$ conditional probability

$= 0.28 * 0.69$

$= 0.19$

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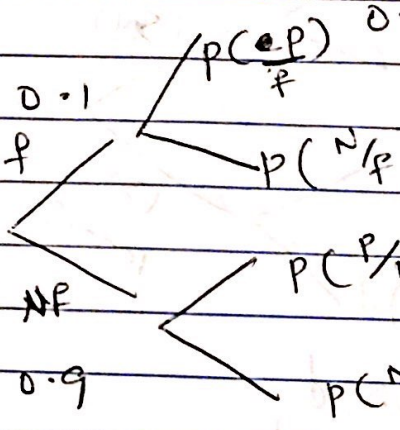
12 $p(\text{fraud}) = 0.1$

$p(CP) = 0.92$ $\quad 0.08 = p(N)$

$p(CN) = 0.90$

$p(P) = 0.1$

$p(f/p) = ?$



$$p(f/p) = \frac{p(p/f) * p(f)}{p(p)}$$

$$p(p) = p(f) * p(p/f) + p(nf) * p(p/nf)$$

$$= (0.1 * 0.92) + (0.9 * 0.1)$$

$$= 0.1 (0.92 + 0.9)$$

$$= 0.0828$$

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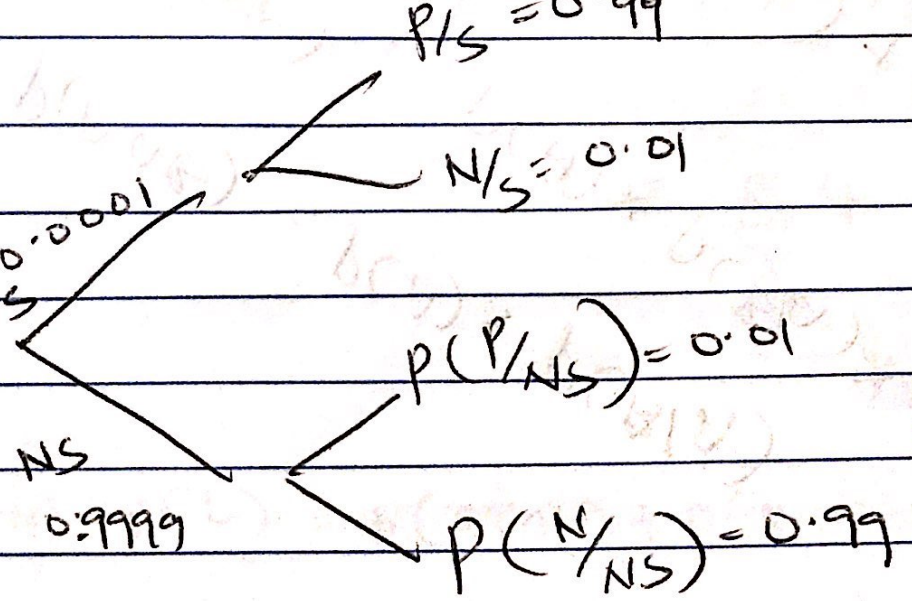
14*



$$P(S/P) = \frac{P(P/S) * P(S)}{P(P)}$$

$$P(P) = P(S) * P(P/S) + P(P/NS) * P(NS)$$

$$= 0.0001 * 0.99 + 0.01 * 0.9999$$

$$= 0.010098$$

$$P(S/P) = \frac{0.99 * 0.0001}{0.010098} = 0.0098$$

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5 Cont.

$P(NRT \cap L) = P(NRT) * P(L/NRT)$

$P(NRNT) = \frac{2}{3} * \frac{1}{4}$

$\frac{1}{2}\frac{2}{3} * \frac{1}{4}_{2} * \frac{1}{4}$

$= \frac{1}{24}$

$P(NRNT \cap L) = P(NRNT) \cap P\left(\frac{L}{NRNT}\right)$

$P(NR \cap NT) = \frac{2}{3} * \frac{3}{4}$

$\Rightarrow \frac{1}{2}\frac{2}{3} * \frac{3}{4}_{2} * \frac{1}{8}$

$= 1/16$

$P(L) = \frac{1}{12} + \frac{1}{24} + \frac{1}{24} + \frac{1}{16}$

$= \frac{4+2+2+3}{48} = 11/48$

iii) $P(R/L) = \frac{P(L/R) * P(R)}{P(L)}$

$P(L/R) = P(L/R) * P(R) = P(R \cap L)$

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

$= 1/12$

$\frac{1}{3} * \frac{1}{2} * 1/4$

$1/24$

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

$= 3/24 = 1/8$

$\Rightarrow \frac{1}{8} / 11/48 = 6/11$

$P(R/L) = 6/11$

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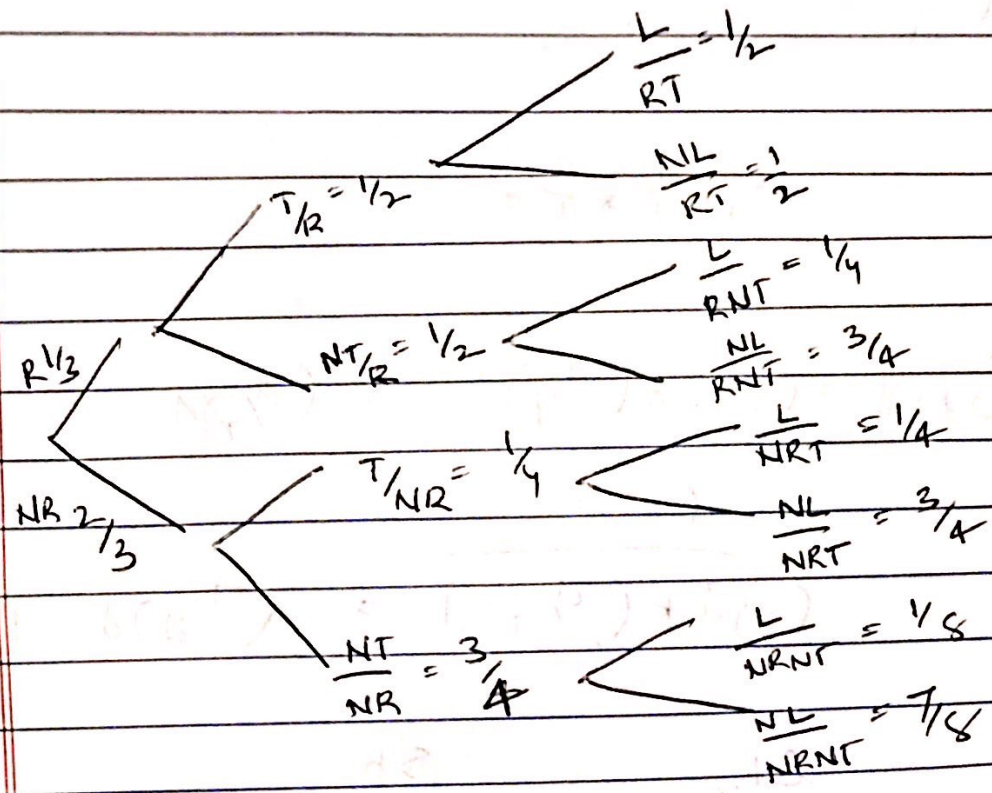
5*



NR = NOT RAINING
R = RAINING
T = TRAFFIC
NT = NO TRAFFIC
L = LATE
NL = NO LATE

i) $R(NR \cap T \cap NL) = p(NR) * p(T/NR) * p\left(\frac{NL}{NRT}\right)$

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

$= \frac{1}{8}$

ii) $p(L) = p(RT \cap L) + p(RNT \cap L) + p(NRT \cap L) + p(NRNT \cap L)$

$P(RT \cap L) = p(RT) * p(L/RT)$ *

$R(R \cap T) \rightarrow \frac{1}{3} * \frac{1}{2}$

$\rightarrow \frac{1}{3} * \frac{1}{2} * \frac{1}{2} = \frac{1}{12}$

$p(RNT \cap L) = p(RNT) * P(L/RNT)$

$P(R \cap NT) = \frac{1}{3} * \frac{1}{2}$

$\rightarrow \frac{1}{3} * \frac{1}{2} * \frac{1}{4} = \frac{1}{24}$

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1) 2+6, 4+6, 6+6

$3/36 = 1/12$

2) 1+1, 1+2, 1+3, 1+4, 1+5
2+2, 2+3, 2+4
3+3

$= 9/36 = 1/4$

4) gg, gb, bg, bb → one of them is girl = 3

Both girls = 1

total $= 1/3$

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