Probability Assignment

(1) (2,6) (4,6) ~~(6,6)~~

(6,2) (6,4)

$P(\text{Sum being even and one die 6}) = \frac{4}{36} = \frac{1}{9}$

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

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

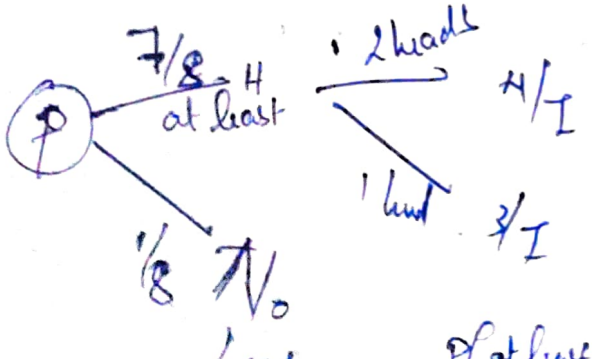
(3,1) (3,2) (3,3)

(4,1) (4,2) ~~(4,3)~~

(5,1)

$P = \frac{15}{36} = \frac{5}{12}$

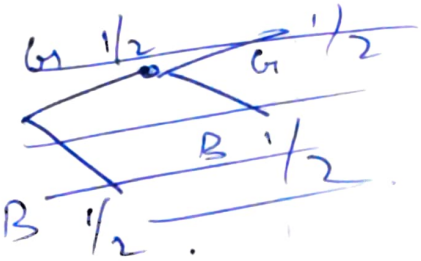
(3)



HHT
HTH
THH
HHH

$P(\text{at least 2 heads} / \text{at least 1 head}) = 4/7$

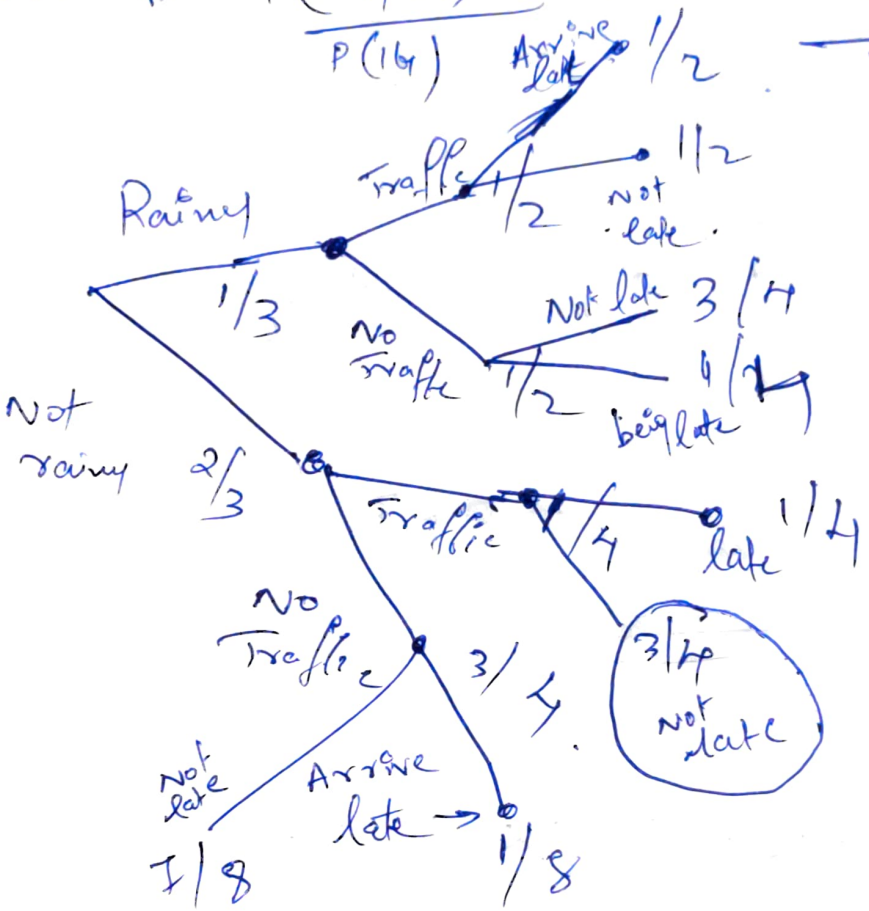
(4)



P (other kid being girl)

$$P(2G/\text{at least } 1G) = \frac{P(1G/2G) \times P(2G)}{P(1G)} = \frac{1 \times \frac{1}{4}}{\frac{3}{4}} = \frac{1}{3}$$

(5)



a) P (Not-raining & heavy traffic & not late)

$$= \frac{3}{4}$$

b) P(late) = P(Raining & Traffic & late) +
P (Raining & No Traffic & late) +
P (not raining & Traffic & late) +
P (not raining & no traffic & late)

$= \frac{1}{3} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{12}$

$+ \frac{1}{3} \times \frac{1}{2} \times \frac{1}{4} + \frac{1}{24}$

$+ \frac{2}{3} \times \frac{1}{4_2} \times \frac{1}{4} + \frac{1}{24}$

$+ \frac{2}{3} \times \frac{3}{4} \times \frac{1}{8_4} + \frac{1}{16}.$

$\frac{4+2+2+3}{48} = \frac{11}{48} = 0.23$

(c) ~~$P(\text{Rain}) \times P(\text{Rain}/\text{late})$~~

$P(\text{Rain}/\text{late}) = \frac{P(R \wedge l)}{P(\text{late})}$

$= \frac{P(\text{Rain}) \times P(\text{late}/\text{rain})}{P(\text{late})}$

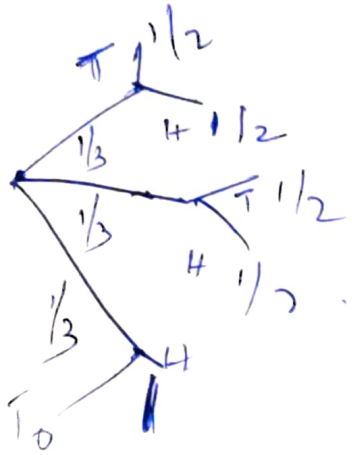
$= \frac{1/3 \times \left[\frac{1}{2} \times \frac{1}{2} + \frac{1}{2} \times \frac{1}{24}\right]}{\frac{11}{48}}$

$$\frac{\frac{1}{12}+\frac{1}{24}}{\frac{11}{48}} = \frac{\frac{3}{24}}{\frac{11}{48}} = \frac{3}{24} \times \frac{48}{11} = \frac{6}{11}$$

$$= 0.545$$

(6) H T H T H H.

a) P(Picking a random coin & getting head)



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

$$= \frac{1}{6}+\frac{1}{6}+\frac{1}{3} = \frac{4}{6}$$

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

b) P(getting head from a two headed coin)

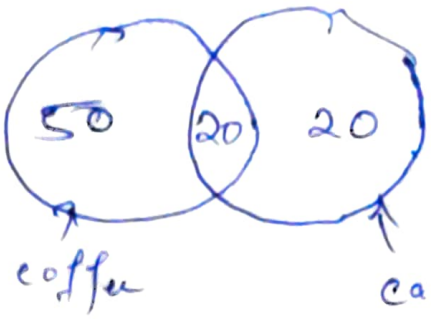
$$= P(\text{two headed}) \times P\left(\frac{\text{head}}{\text{two headed}}\right)$$

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

$$P(2H \text{ coin} \mid \text{Head}) = \frac{P(\text{coin}) \times P(\text{Head}/\text{coin})}{P(\text{Head})}$$

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

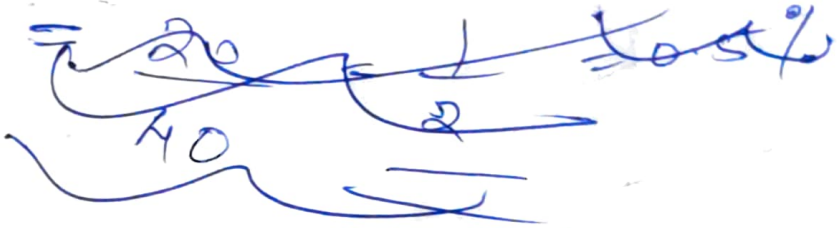
(7)



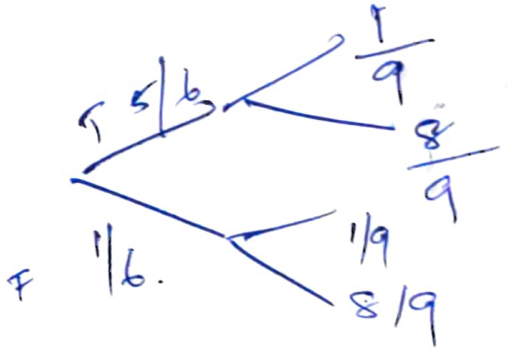
$P(\text{coffee/cake}) = \dfrac{P(\text{cake/coffee}) \times P(\text{coffee})}{P(\text{cake})}$

$= \dfrac{0.7 \times 0.2}{0.4}$

$P(\text{coffee/cake}) = \dfrac{P(\text{coffee} \cap \text{cake})}{P(\text{cake})} = 0.35$



(8) $P(\text{Truth}) = \frac{5}{6}$



B
1 W

$P(\text{white ball drawn}) = \frac{5}{6} \times \frac{1}{9} + \frac{1}{6} \times \frac{8}{9}$

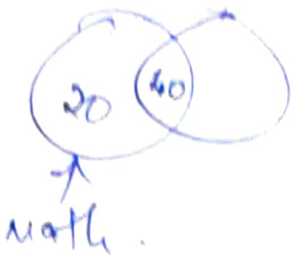
(9) $P(\text{Truth}) = \frac{4}{5}$

$\frac{13}{54}$

$P(\text{getting 6}) = \frac{4}{5} \times \frac{1}{6} + \frac{1}{5} \times \frac{5}{6}$

$= 9/30 = 3/10$

(10)



$$P(M \wedge S) = \frac{40}{100}$$

$$P(M) = \frac{60}{100}$$

$$P\left(\frac{\text{Science}}{\text{Maths}}\right) = \frac{P(M \wedge S)}{P(M)}$$

$$P(S/M) = \frac{40}{60} = \frac{4}{6} = 0.66$$

(11)

	Graduate	PG	Total
Male	19	41	60
Female	12	28	40
Total	31	69	100

a) $P(M \wedge G) = P(\text{male}) \times P\left(\frac{G}{M}\right)$

$$= \frac{60}{100} \times \frac{19}{60} = \frac{19}{100} = 0.19$$

Joint Probability

$\frac{31}{100} \times \frac{19}{31}$

b) $P(\text{Male}) = \frac{60}{100}$

c) $P(\text{Graduate}) = \frac{31}{100} = 0.31$

Marginal Probability

d) $P\left(\frac{P}{F}\right) = \frac{P(P \wedge F)}{P(F)}$ — conditional probability

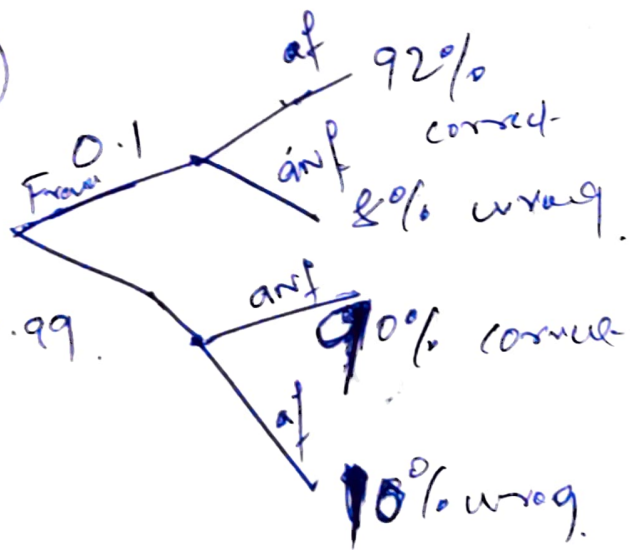
$= 2/8$

$P(\text{female}/\text{Postgraduate}) = \frac{P(PG \wedge \text{Female})}{P(\text{Post graduate})}$

$= \frac{2/8}{6/9}$

$= \frac{1}{3}$

(12)



$P(f/af) = \frac{P(af/f) \times P(f)}{P(af)}$

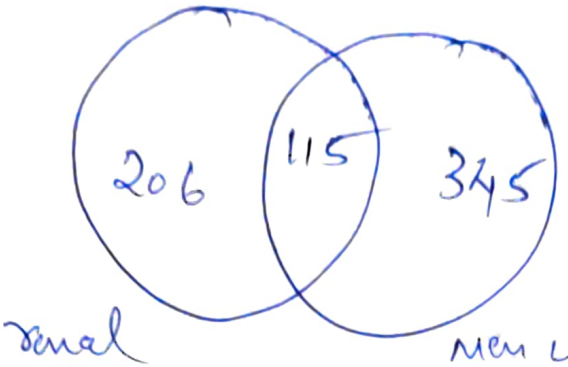
$P(\text{fraud claim}/\text{Test fraud}) = P(\text{Test fraud}/\text{fraud}) \times P(\text{fraud}) / P(\text{Test fraud})$

$= \frac{0.92 \times 0.1}{0.92 \times 0.1 + 0.1 \times 0.99}$

$= \frac{0.092}{0.181} = 0.508$

(13)

0.01099

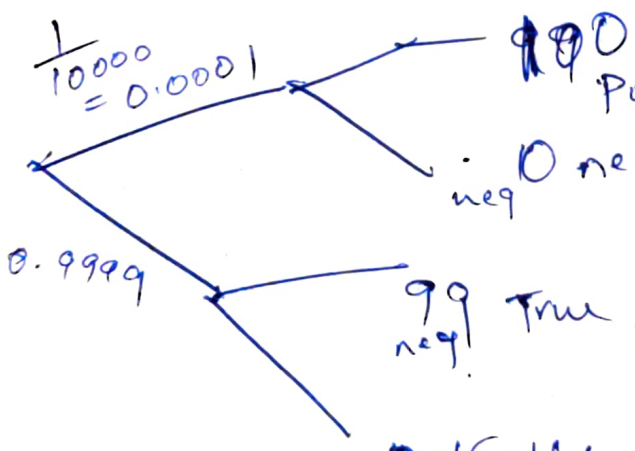


renal failure

men with one parent renal failure

206 died of renal failure with neither of parents having it.

(14) $P(\text{swine flu}) = \frac{1}{10000}$



$P(\text{swine flu} \mid \text{test +ve})$

~~$= 0.0001 \times 1$~~

~~$+ 0.9999 \times 0.01$~~

$$P(\text{swine flu} \mid \text{+ve}) = \frac{P(\text{+ve} \mid \text{swine flu}) \times P(\text{swine flu})}{P(\text{positive})}$$

$$= \frac{1 \times 0.0001}{1 \times 0.0001 + 0.999 \times 0.01} = 0.009902$$