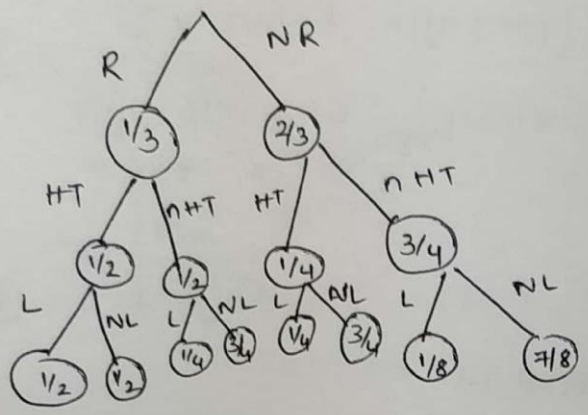
01/04/2020

Conditional, Joint & Marginal Probability

(5)



a) NR – HT – NL

$\frac{2}{3} \times \frac{1}{4} \times \frac{3}{4} = 1/8$

b) $L = \frac{1}{3} \times \frac{1}{2} \times \frac{1}{2} + \frac{1}{3} \times \frac{1}{2} \times \frac{1}{4} + \frac{2}{3} \times \frac{1}{4} \times \frac{1}{4}$

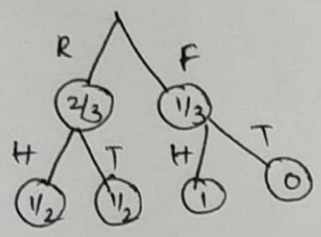
$+ \frac{2}{3} \times \frac{3}{4} \times \frac{1}{8}$

$= 11/48$

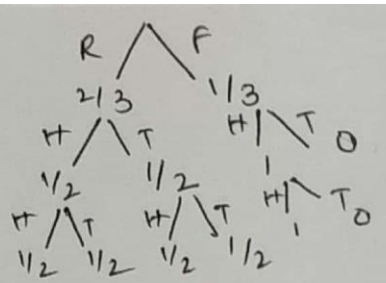
c) $P(R/L) = \frac{P(R \cap L)}{P(L)} = \frac{\frac{1}{3} \times \frac{1}{2} \times \frac{1}{2} + \frac{1}{3} \times \frac{1}{2} \times \frac{1}{4}}{11/48}$

$= 6/11$

(6)



Toss →



a) $H = \frac{2}{3} \times \frac{1}{2} + \frac{1}{3} \times 1 = \underline{\underline{2/3}}$

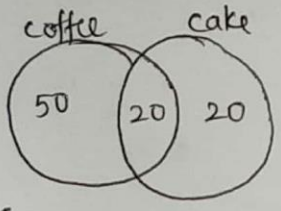
b) $P(F/H) = \frac{P(F \cap H)}{P(H)} = \frac{1/3}{2/3} = \underline{\underline{1/2}}$

Even if we Toss probability is still $\underline{\underline{1/2}}$

$P(H) = \frac{1}{2} \times \frac{1}{2} \times \frac{2}{3} + \frac{1}{2} \times \frac{1}{2} \times \frac{2}{3} + \frac{1}{3} = \frac{1}{2} \times \frac{2}{3} + \frac{1}{3} = \frac{2}{3}$

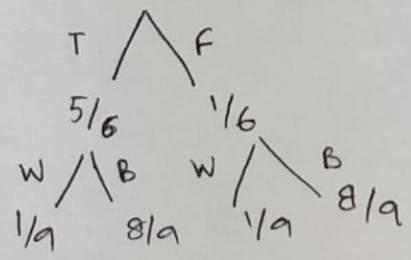
$P(F/H) = \frac{F(F \cap H)}{P(H)} = \frac{1/3}{2/3} = \underline{\underline{1/2}}$

(7)



$P(\text{coffee}/\text{cake}) = \frac{P(\text{coffee} \cap \text{cake})}{P(\text{cake})} = \frac{20}{40} = \underline{\underline{1/2}}$

(8)



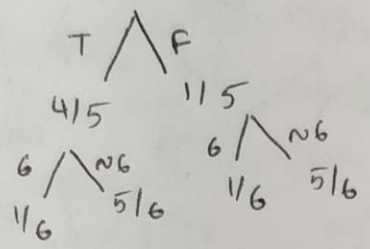
$P(\text{A saying white ball}) = \frac{5}{6} \times \frac{1}{9} + \frac{1}{6} \times \frac{8}{9}$

$= \frac{13}{54}$

$P(W/\text{A saying white ball}) = \frac{P(W \cap \text{A saying white ball})}{P(\text{A saying white ball})}$

$$= \frac{5/6 \times 1/9}{13/54} = \underline{\underline{5/13}}$$

(9)



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

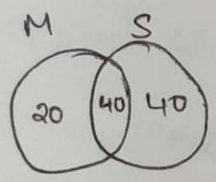
$$= 9/30$$

P(Actual 6 when A reports 6)

= P(Actual 6 / A Reporting 6)

$$= \frac{4/5 \times 1/6}{9/30} = \underline{\underline{4/9}}$$

(10)



$$P(S/M) = \frac{P(S \cap M)}{P(M)} = \frac{40}{60} = \underline{\underline{\frac{2}{3}}}$$

(11) a)

	G	PG	T
M	19	41	60
F	12	28	40
T	31	69	100

$P(M \cap G) = 19/100$ → Joint

b) $P(M) = 60/100$

c) $P(G) = 31/100$ → Marginal.

d) $P(F/PG) = 28/69$ → conditional