Farm → Crop Analytics → what to plant & when to plant,

intact and yield more money.

Probability Assignment

A1) 2 dice
- sum of # be even = $\frac{1}{2}$ — (6,2), (6,4), (6,6), (2,6), (4,6)
- one of the die shows 6 = $\frac{1}{6}$

Total number of possibilities when 2 dice are rolled = 36

$P(E1) = \frac{5}{36}$

A2) (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), (4,4), (4,5), (4,6)
(5,1), (5,2), (5,3), (5,4), (5,5), (5,6)
(6,1), (6,2), (6,3), (6,4), (6,5), (6,6)

$E(2) = \frac{15}{36} = \frac{5}{12}$

$E(3) = \frac{21}{36} = \frac{7}{12}$

A3) Probability of seeing 2 or more heads

H H H H H H H H H H H H H H H H

$\frac{}{2}$ $\frac{H}{2}$ $\frac{H}{2}$

Total # of possibilities = 8

Normal prob = $\frac{1}{2} = 50\%$

$P(A) = 7/8$, $P(B) = 4/8$

$P(AB) = 4/8$

P(Atleast 2H | Atleast 1H)

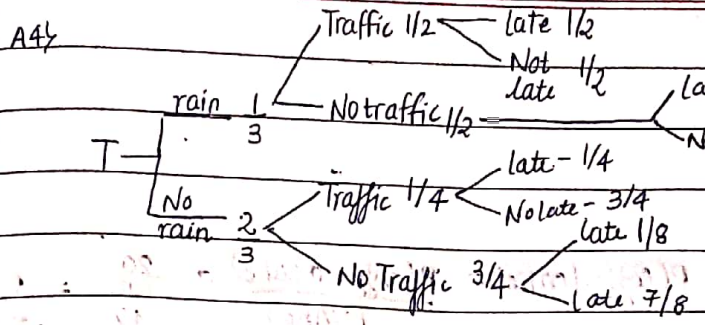
$P(A|B) = \frac{P(AB)}{P(B)} = \frac{4/8}{7/8} = \frac{4}{7}$

There are eight different arrangements, but we have eliminated one of them by stipulating: "given that you have observed atleast one head"

So out of that 7 combinations, we have 4 where you 2 or more hea

$\therefore P(E4) = \frac{4}{7}$

A4)



$P(\text{Not training} \mid \text{heavy traffic} \mid \text{not late}) = \frac{2}{3} \times \frac{1}{2} \times \frac{3}{4} = \frac{1}{8}$

$P(\text{Not raining there is heavy traffic \& I am not late}) = \frac{3}{8}$

$P(\text{I am late}) = \frac{1}{2}\cdot\frac{1}{4}\cdot\frac{1}{4}\cdot\frac{1}{8} = \frac{1}{2}\times\frac{1}{2}\times\frac{1}{3} + \frac{1}{4}\times\frac{1}{2}\times\frac{1}{3} + \frac{2}{3}\times\frac{1}{4}\times\frac{1}{4} + \frac{2}{3}\times\frac{3}{4}\times\frac{1}{8}$

$= \frac{1}{12} + \frac{1}{24} + \frac{1}{24} + \frac{1}{16} = \frac{1}{6} + \frac{7}{16} = \frac{16+42}{6\times16} = \frac{29}{48}$ 11

$P(\text{Rained} \mid \text{late}) = P(A|B) = \frac{P(AB)}{P(B)} = \frac{P(\text{Rain} \cap \text{late})}{P(\text{late})} = \frac{P(\text{late} \mid \text{rains}) \cdot P(\text{rains})}{P(\text{late})}$

$P(\text{Rain} \cap \text{late}) = P(\text{Rain}) \cap P(\text{late})$

$= P(\text{Rain}) \cap P(\text{late} \mid \text{rain})$

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

$= \frac{1}{3} \times \left(\frac{1}{4} + \frac{1}{8}\right)$

$= \frac{1}{3} \cdot \left(\frac{2+1}{8}\right)$

$= 1/8$

$P(\text{late} \mid \text{rains}) = \frac{1}{2}\times\frac{1}{2}\times\frac{1}{3} + \frac{1}{4}\times\frac{1}{2}\times\frac{1}{3}$

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

$= \frac{24+12}{24\times12}$

$= 1/8$

$P(\text{Rained} \mid \text{late}) = \frac{3}{8} \cdot \frac{1}{3}$

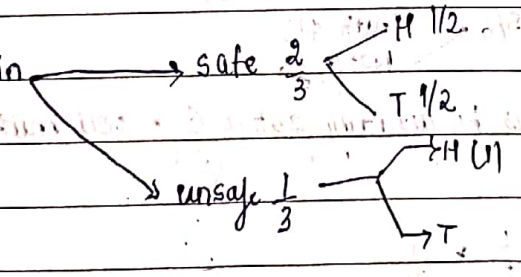
$= \frac{1\times48}{8\times29}\ 6$

$= \frac{6}{29}$

$= \frac{1}{8}\times\frac{1}{3} \quad \frac{1}{24}\times\frac{48}{11}$

$\frac{11}{48} = 2/11$

A5)



$P(\text{unsafe} \mid H) = \frac{P(H \mid \text{unsafe}) \cdot P(\text{unsafe})}{P(H)}$

$P(\text{unsafe} \mid H) = \frac{1 \cdot 1/3}{2/3} = \frac{1\times3}{3\times2} = \frac{1}{2}$

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

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

$P(H) = \frac{2}{3} = 0.667$

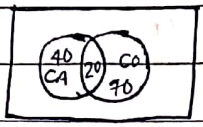
$P(\text{unsafe} \mid \text{Heads}) = P(\text{Unsafe}) \cap P(H)$

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

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

$P(\text{unsafe} \mid \text{Heads}) = \frac{1}{4}$

6) Venn diagram



$P(\text{coffee}) = 0.7$

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

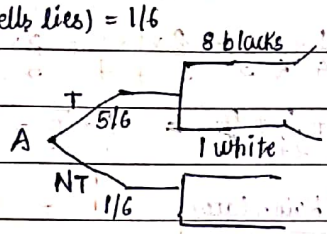
$P(\text{coffee} \cap \text{cake}) = 0.2$

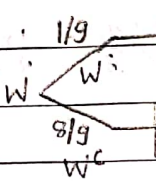
$P(\text{coffee} \mid \text{cake}) = \frac{P(\text{coffee} \cap \text{cake})}{P(\text{cake})} = \frac{20/100}{40/100} = \frac{1}{2}$

7), 8), 9), 10) are distribution questions

11) $P(A \text{ tells truth}) = 5/6$

$P(A \text{ tells lies}) = 1/6$



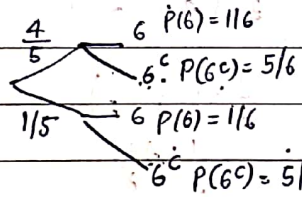


(P1) Actually White & True $= \frac{5}{6} \times \frac{1}{9} = \frac{5}{54}$

Not White but False (P2) $= \frac{1}{6} \times \frac{8}{9}$

$\frac{5}{13} = \frac{5/54}{\frac{5}{54} + \frac{8}{54}}$ = desired = $\frac{\text{Actual white}}{\text{Actual white} + \text{False white}}$

12) $P(A) = 4/5$ $P(A^c) = 1/5$



Let E_1 be the event of getting 6 on a die

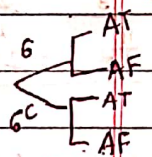
$E_1 = 1/6$

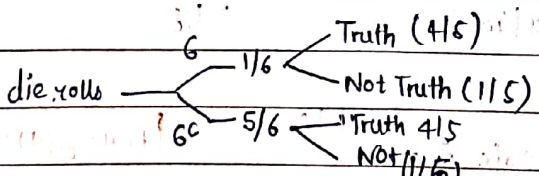
Let E_2 be event of not getting a 6 on die

$E_2 = 5/6$

$P(A|E_1) = 4/5$

$P(A|E_2) = 1/5$





He says he got a 6, that means he actually got a 6 & tell truth, he didn't got 6 and tell lies (P2) (P1)

$P1 = P(S) \times P(T) = \frac{1}{6} \times \frac{4}{5} = \frac{4}{30}$

$P2 = \frac{5}{6} \times \frac{1}{5} = \frac{1}{6}$

$\frac{\text{Actual}}{\text{Whole}}$ $\frac{\text{A is actually 6}}{\text{A reports 6}}$

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

$= \frac{4 \times 30}{30 \times 9}$

$= \frac{4}{9}$

So desired probability = Probability of actually getting a six

$= \frac{\text{Actual six}}{\text{Actual + false six}} = \frac{\frac{4}{30}}{\frac{4}{30} + \frac{1}{6}} = \frac{4 \times 30}{30 \times 9}$

$= \frac{4}{9}$