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ASSIGNMENT 1

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1 P(A speaks truth) = 3/5

P(A speaks lie) = $1 - \frac{3}{5} = \frac{2}{5}$

P(B speaks truth) = $\frac{5}{8}$

P(B speaks lie) = $\frac{3}{8}$

∴ Identical issue = P(A speaks truth) . P(B speaks lie) + P(A lies) . P(B true)

$= \frac{3}{5} \times \frac{3}{8} + \frac{2}{5} \times \frac{5}{8}$

$= \frac{9}{40} + \frac{10}{40} = \frac{19}{40}$

Percentage = $\frac{19}{40} \times 100\% = 47.5\%$

2 6R 3B

P(1st ball red) = $\frac{6}{9}$

∴ Urn = 5R, 4B

P(Red ball) = $\frac{2}{4} \times \frac{5}{9}$

∴ P(Case 1) = $\frac{6}{9} \times \frac{5}{9} = \frac{30}{81} = \frac{10}{27}$

P(1st ball Blue) = $\frac{3}{9} = \frac{1}{3}$

∴ Urn = 7R, 2B

∴ P(Red ball) = $\frac{7}{9}$

∴ P(Case II) = $\frac{1}{3} \times \frac{7}{9} = \frac{17}{27}$

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conditional P = 10/27 + 7/27 = 17/27

3 P(possible configuration) = 1/25 = 1/32

P = 1/32 excluding P(all 5 girls) and P(all 5 boys) from favourable cases

= P = 30/31

4 2 G, 3 W

P(G) = 2/5 ; P(W) = 3/5

P(king 52) = 4/52

P(king 16) = 4/16

P(G and K) = 2/5 × 4/52 = 2/65

P(W and K) = 3/5 × 4/16 = 3/20

P(K) = 2/65 + 3/20 = 47/260

P(W/K) = 3/20 / 47/260 = 39/47

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$S = \{HHH, HHT, HTH, THH, HTT, THT, TTH, TTT\}$

(a) $P(3 \text{ Heads}) = \frac{1}{8}$

(b) $P(1 \text{ Head}) = \frac{3}{8}$

(c) $P(\text{atleast } 1 \text{ Head}) = \frac{7}{8}$

$P(\text{atleast } 2 \text{ heads}) = 4/8$

$P(1H/2H) = \frac{4}{8} \times \frac{8}{7} = \frac{4}{7}$

8 $P(A \cup C) = \frac{2}{3}$; $P(B \cup C) = \frac{3}{4}$; $P(A \cup B \cup C) = \frac{11}{12}$

$P(A \cup C) = \frac{2}{3} = P(A) + P(C) - P(A \cap C)$

$= \frac{3}{4} = P(B) + P(C) - P(B \cap C)$

$P(A \cup B \cup C) = \frac{11}{12} = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$

$\therefore P(A) + P(B) + P(C) - \left[P(A) + P(C) - \frac{2}{3} \right]$

$\therefore -P(C) = \frac{11}{12} - \frac{2}{3} - \frac{3}{4} = -\frac{1}{2}$

$\boxed{P(C) = \frac{1}{2}}$

$\therefore P(A) + P(C) - P(A) \cdot P(C) = \frac{2}{3}$ (A & C independent)

$P(A) + \frac{1}{2} - \frac{1}{2} P(A) = \frac{2}{3}$

$\boxed{P(A) = \frac{2}{6}}$

$P(B) + P(C) - P(B) P(C) = \frac{3}{4}$

$\therefore \frac{1}{2} P(B) = \frac{1}{4}$

$\boxed{P(B) = \frac{1}{2}}$

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C_1 = Regular coin, C_2 = Two headed coin.

9 $P(H/C_1) = 0.5$

$P(H/C_2) = 1$

(a) Total Probability $= P(H) = P(H/C_1)P(C_1) + P(H/C_2)P(C_2)$

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

(b) $P(C_2/H) = \frac{1 \cdot 1/3}{2/3} = \frac{1}{2}$

(10) $P(\text{Not defective}) = \frac{95}{100}$

$P(\text{one good item}) = \frac{94}{99}$

$P(\text{third good item}) = \frac{93}{98}$

$\therefore P(A_1 \cap A_2 \cap A_3) = P(A_1)\, P(A_2/A_1)\, P(A_3/A_2, A_1)$

$= \frac{95}{100} \times \frac{94}{99} \times \frac{93}{98} = 0.857$