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08041

PROBABILITY & STATISTICS HW 1

Date M T W T F S S

1) 5 Red, 5 White, 15 Black

Total = $5x + 5x + 2(5x)$

$1 = 20x$

$x = 0.05$.

a) Red = $10(0.05) = \boxed{0.5}$

b) $P(R' \cap B') = 1 - 5(0.05) - 10(0.05) = 0.25$

c) $P(B') = 1 - P(B) = 1 - 0.25 = 0.175$

d) $P(\Omega) = 1$.

2) [1, 2, 3, 4] [1, 2, 3, 4]

Sum of 5 = [(1, 4), (2, 3), (3, 2), (4, 1)]

$2/4 = \boxed{1/2}$ Ans.

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3) 5 Red, 10 White, 10 Black, 5 Orange.

a) Total Balls = 30.
Chance of Red = $5/30$.

Chance of both Red = $5/30 \times 4/29$
$= \boxed{2/87 \text{ OR } 0.023}$ Ans.

b) Chance of Orange = $5/30$.

$\therefore P(O|R) = 5/30 \times 5/29 = \boxed{5/174 \text{ OR } 0.029}$ Ans.

4) No one uses phone = 0.05
Chance of Speech = 0.75

Chance of Speech = P(Someone using Phone) x P(Speech) in Next Class
$= (1 - 0.05) \times 0.75$
$= 0.95 \times 0.75$
$= \boxed{0.7125}$ Ans.

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5) 1 Blue, 99 Green:

$P(\text{Actually Blue}) = 0.01 \times 0.99 = 0.0099$

$P(\text{Mistakenly Blue}) = 0.99 \times 0.02 = 0.0198$

$$P(\text{Blue} \mid \text{Witness' Statement}) = \frac{0.0099}{0.0099 + 0.0198}$$

$= 0.333$ Ans.

6) LA = 0.10, P = 0.15, N/A = 0.75.

LA Theorem = 0.25, P Theorem = 0.20

$$P(P \mid T) = \frac{0.15 \times 0.20}{(0.15 \times 0.20) + (0.25 \times 0.10)}$$

$= 0.545$ Ans.

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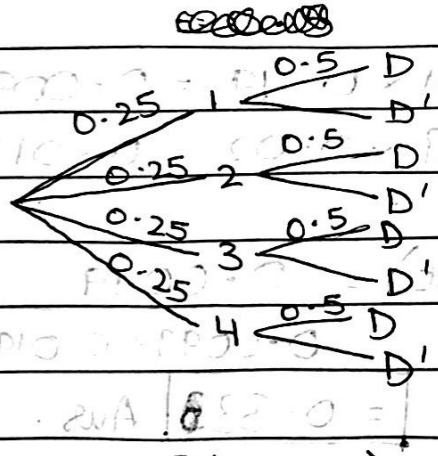
7) $P(\text{Destination}) = 4 \times (0.25 \times 0.5) = \boxed{0.5}$ Ans.



8) $P(R_1|G) = 0.1$, $P(GR_1|G) = 0.9$

$P(R_2|G) = 0.25$, $P(GR_2|G) = 0.75$

$P(R_1|B) = P(R_2|B) = P(GR_1|B) = P(GR_2|B) = 0.5$

$P(G) = 0.75$, $P(B) = 0.25$

$P(\text{Two Reds}) = 0.75(0.10 \times 0.25) + 0.25(0.5 \times 0.5) =$

$\boxed{= 0.08125}$ Ans.

9) $P(A \cap B) = [1, 2] = \frac{12}{36}$

$P(A) = 18/36$, $P(B) = 18/36$

$\therefore P(A \cap B) = P(A) \cdot P(B)$

$\frac{12}{36} \neq \frac{18}{36} \times \frac{18}{36}$

Since $P(A \cap B) \neq P(A) \cdot P(B) \longrightarrow$ Not Independent.

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10) $P(A) = 18/36$, $P(B) = 6/36$

$P(A \cap B) = 3/36$.

$\therefore P(A \cap B) = P(A) \cdot P(B)$

$3/36 = 18/36 \times 6/36$

$1/12 = 1/2 \times 1/6$

$1/12 = 1/12$

Since $P(A \cap B) = P(A) \cdot P(B) \longrightarrow$ Independent .

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