Taller 8. Probabilidad

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Punto 2

Probabilidad condicional y total

Eventos

Urna 1 = U1 = Extraer una bola de la urna 1

Urna 2 = U2 = Extraer una bola de la urna 2

Roja = R = Extraer una bola de color rojo

Negra = N = Extraer una bola de color negro

Verde = V = Extraer una bola de color verde

Probabilidades

$P(U1) = \frac{2}{6} = \frac{1}{3}$ $\quad P(R \mid U1) = \frac{\frac{1}{10}}{\frac{1}{3}} = \frac{3}{10}$

$P(U2) = \frac{4}{6} = \frac{2}{3}$ $\quad P(R \mid U2) = \frac{\frac{4}{10}}{\frac{2}{3}} = \frac{12}{20} = \frac{6}{10} = \frac{3}{5}$

$P(N \mid U1) = \frac{1}{10}$

$P(N \mid U2) = \frac{2}{10} = \frac{1}{5}$

a) $P(R)$

$$P(R) = P(U1) \cdot P(R \mid U1) + P(U2)\, P(R \mid U2)$$

$$= \frac{1}{\cancel{3}} \cdot \frac{\cancel{3}}{10} + \frac{2}{\cancel{3}} \cdot \frac{\cancel{3}}{5}$$

$$= \frac{1}{10} + \frac{2}{5} = \frac{5 + 20}{50} = \frac{25}{50} = \frac{1}{2}$$

$P(R) = \frac{1}{2}$ R/.

b) $P(N)$

$$P(N) = P(U1) \cdot P(N|U1) + P(U2)\, P(N|U2)$$

$$= \frac{1}{3} \cdot \frac{1}{10} + \frac{2}{3} \cdot \frac{1}{5}$$

$$= \frac{1}{30} + \frac{2}{15} = \frac{1}{30} + \frac{4}{30} = \frac{5}{30} = \frac{1}{6}$$

$$P(N) = \frac{1}{6}$$ R/.

c) $$P(U1|N) = \frac{P(U1)\, P(N|U1)}{P(U1) \cdot P(N|U1) + P(U2) \cdot P(N|U2)}$$

$$= \frac{P(U1)\, P(N|U1)}{P(N)}$$

$$= \frac{\frac{1}{3} \cdot \frac{1}{10}}{\frac{1}{6}} = \frac{\frac{1}{30}}{\frac{1}{6}} = \frac{6}{30} = \frac{1}{5}$$

$$P(U1|N) = \frac{1}{5}$$ R/.

d) $$P(U2|N) = \frac{P(U2)\, P(N|U2)}{P(U1) \cdot P(N|U1) + P(U2) \cdot P(N|U2)}$$

$$= \frac{P(U2)\, P(N|U2)}{P(N)}$$

$$= \frac{\frac{2}{3} \cdot \frac{1}{5}}{\frac{1}{6}} = \frac{\frac{2}{15}}{\frac{1}{6}} = \frac{12}{15} = \frac{4}{5}$$

$$P(U2|N) = \frac{4}{5}$$ R/.