Question 12.13.3.42

Refer to Question 41 above. If a white ball is selected, what is the probability that it came from

1) Bag 2
2) Bag 3

Solution:

Referring to the above question,

Parameter	Values	Description
X	0	red balls
	1	white balls
Y	1	Bag 1
	2	Bag 2
	3	Bag 3

TABLE 2
TABLE 1

1) $\Pr(Y = 2|X = 1)$

$$\Pr(Y = 2|X = 1) = \frac{\Pr(Y = 2) \cdot \Pr(X = 1|Y = 2)}{\Pr(Y = 1) \cdot \Pr(X = 1|Y = 1) + \Pr(Y = 2) \cdot \Pr(X = 1|Y = 2) + \Pr(Y = 3) \cdot \Pr(X = 1|Y = 3)} \tag{1}$$

$$= \frac{\frac{2}{6} \cdot \frac{1}{3}}{\frac{1}{6} \cdot 0 + \frac{2}{6} \cdot \frac{1}{3} + \frac{3}{6} \cdot 1} \tag{2}$$

$$= \frac{\frac{2}{18}}{\frac{2}{18} + \frac{3}{6}} \tag{3}$$

$$= \frac{2}{11} \tag{4}$$

2) $\Pr(Y = 3|X = 1)$

$$\Pr(Y = 3|X = 1) = \frac{\Pr(Y = 3) \cdot \Pr(X = 1|Y = 3)}{\Pr(Y = 1) \cdot \Pr(X = 1|Y = 1) + \Pr(Y = 2) \cdot \Pr(X = 1|Y = 2) + \Pr(Y = 3) \cdot \Pr(X = 1|Y = 3)} \tag{5}$$

$$= \frac{\frac{3}{6} \cdot 1}{\frac{1}{6} \cdot 0 + \frac{2}{6} \cdot \frac{1}{3} + \frac{3}{6} \cdot 1} \tag{6}$$

$$= \frac{\frac{3}{6}}{\frac{2}{18} + \frac{3}{6}} \tag{7}$$

$$= \frac{9}{11} \tag{8}$$