12.13.1.41

EE22BTECH11010 - Aryan Bubna

question: Three bags contains a no of red and white balls as follows:

B_1: 3 red balls,B_2:2 red balls and 1 white ball,B_3:3 white balls

The probability that bag i will be chosen and a ball is selected is i/6,i=1,2,3.

what is the probability that

(i) a red ball will be selected?

(ii) a white ball will be selected?

Solution:

ball	RV	values	description
white ball	X	0	not selected
		1	selected
red ball	Y	0	not selected
		1	selected

TABLE 0: random variables of white and red ball

$$\Pr(B_1) = \frac{1}{6} \tag{1}$$

$$\Pr(B_2) = \frac{2}{6} \tag{2}$$

$$\Pr(B_3) = \frac{3}{6} \tag{3}$$

1) The probability that a red ball will be selected is:

$$\Pr(Y=1) = \Pr(B_1).\Pr(Y=1|B_1) + \Pr(B_2).\Pr(Y=1|B_2) + \Pr(B_3).\Pr(Y=1|B_3) \tag{4}$$

$$= \frac{1}{6}.\frac{3}{3} + \frac{2}{6}.\frac{2}{3} + \frac{3}{6}.0 \tag{5}$$

$$= \frac{7}{18} \tag{6}$$

2) The probability that a red ball will be selected is:

$$\Pr(X=1) = \Pr(B_1).\Pr(X=1|B_1) + \Pr(B_2).\Pr(X=1|B_2) + \Pr(B_3).\Pr(X=1|B_3) \tag{7}$$

$$= \frac{1}{6}.0 + \frac{2}{6}.\frac{1}{3} + \frac{3}{6}.\frac{3}{3} \tag{8}$$

$$= \frac{11}{18} \tag{9}$$