

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:

object	RV	values	description
bag	X	1	bag-1 is selected
		2	bag-2 is selected
		3	bag-3 is selected
ball	Y	0	white ball is selected
		1	red ball is selected

TABLE 0: random variables of white and red ball

$$\Pr(X = 1) = \frac{1}{6} \quad (1)$$

$$\Pr(X = 2) = \frac{2}{6} \quad (2)$$

$$\Pr(X = 3) = \frac{3}{6} \quad (3)$$

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

$$\Pr(Y = 1) = \Pr(X = 1) \cdot \Pr(Y = 1|X = 1) + \Pr(X = 2) \cdot \Pr(Y = 1|X = 2) + \Pr(X = 3) \cdot \Pr(Y = 1|X = 3) \quad (4)$$

$$= \frac{1}{6} \cdot \frac{3}{3} + \frac{2}{6} \cdot \frac{2}{3} + \frac{3}{6} \cdot 0 \quad (5)$$

$$= \frac{7}{18} \quad (6)$$

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

$$\Pr(Y = 0) = \Pr(X = 1) \cdot \Pr(Y = 0|X = 1) + \Pr(X = 2) \cdot \Pr(Y = 0|X = 2) + \Pr(X = 3) \cdot \Pr(Y = 0|X = 3) \quad (7)$$

$$= \frac{1}{6} \cdot 0 + \frac{2}{6} \cdot \frac{1}{3} + \frac{3}{6} \cdot \frac{3}{3} \quad (8)$$

$$= \frac{11}{18} \quad (9)$$