Assignment-3

EE22BTECH11012-A.Chhatrapati

Question 10.13.3.37)A child's game has 8 triangles of which 3 are blue and rest are red, and 10 squares of which 6 are blue and rest are red. One piece is lost at random. Find the probability that it is a

(i) triangle
(ii) square
(iii) square of blue colour
(iv) triangle of red colour

Solution:

TABLE 4
Random Variables

Variable	Value	Description
X	1	Triangle
	0	Square
Y	1	Blue coloured
	0	Red coloured

$$p_X(X) = \begin{cases} \frac{10}{18}, & \text{if X=0} \\ \frac{8}{18}, & \text{if X=1} \end{cases} \tag{1}$$

$$\text{For X=0, } p_{Y|X}(Y) = \begin{cases} \frac{4}{10}, & \text{if Y=0} \\ \frac{6}{10}, & \text{if Y=1} \end{cases} \tag{2}$$

$$\text{For X=1, } p_{Y|X}(Y) = \begin{cases} \frac{5}{8}, & \text{if Y=0} \\ \frac{3}{8}, & \text{if Y=1} \end{cases} \tag{3}$$

(i) $p_X(1) = \frac{8}{18}$
(ii) $p_X(0) = \frac{10}{18}$
(iii) $p_{XY}(0,1) = p_{Y|X}(Y=1|X=0)\,p_X(0)$
$= \frac{6}{10} \times \frac{10}{18} = \frac{6}{18}$
(iv) $p_{XY}(1,0) = p_{Y|X}(Y=0|X=1)\,p_X(1)$
$= \frac{5}{8} \times \frac{8}{18} = \frac{5}{18}$