Assignment-4
(CBSE 12th Ex 16.3)

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example 23:

A bag contains 2 white and 1 red balls. One ball is drawn at random and then put back into the box after noting its colour. The process is repeated again. If X denotes the number of red balls recorded in the two draws, describe X.

Solution:

Let the balls in the bag be denoted by w_1, w_2 and r as the two white balls are not identical. Then the sample space is:

$$S = \{w_1w_1,\ w_1w_2,\ w_2w_2,\ w_2w_1,\ w_1r,\ w_2r,\ rw_1,\ rw_2,\ rr\}$$

Let ω be an element of the sample space. i.e.,

$$\omega \in S$$

Given that X denotes the number of red balls, then

$$\mathrm{X}(\omega) = \text{No. of red balls in } \omega$$

Therefore,

$$\mathrm{X}(\{w_1w_1\}) = \mathrm{X}(\{w_1w_2\}) = \mathrm{X}(\{w_2w_1\}) = \mathrm{X}(\{w_2w_2\}) = 0$$
$$\mathrm{X}(\{r\ w_1\}) = \mathrm{X}(\{r\ w_2\}) = \mathrm{X}(\{w_1\ r\}) = \mathrm{X}(\{w_2\ r\}) = 1$$
$$\mathrm{X}(\{r\ r\}) = 2$$

Thus X is a random variable with values 0, 1 and 2.