Assignment 2
AI1110:Probability And Random Variables
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10.15.2.4:A box contains 12 balls out of which x are black.If one ball is drawn at random from the box,what is the probability that it will be a black ball? If 6 more black balls are put in the box,the probability of drawing a black ball is now double of what it was before.Find x.

Solution:

Let X_1 be a random variable that take values 0 and 1 before 6 more black ball added.

Let X_2 be a random variable that take values 0 and 1 after 6 more black ball added.

Random Variable	Value	Description
X_1	1	Selected ball is black
	0	otherwise
X_2	1	Selected ball is a black
	0	otherwise

TABLE 0
RANDOM VARIABLE DECRIPTION

Now

$$\Pr(X_1 = 1) = \frac{\text{Total black balls}}{\text{Total balls}} \tag{1}$$
$$= \frac{x}{12} \tag{2}$$

$$\Pr(X_2 = 1) = \frac{\text{Total black balls}}{\text{Total balls}} \tag{3}$$
$$= \frac{x+6}{18} \tag{4}$$

According to the Question,

$$\Pr(X_2 = 1) = 2(\Pr(X_1 = 1)) \tag{5}$$
$$\frac{x+6}{18} = 2\left(\frac{x}{12}\right) \tag{6}$$
$$\frac{x+6}{18} = \frac{x}{6} \tag{7}$$
$$6(x+6) = 18x \tag{8}$$
$$6x + 36 = 18x \tag{9}$$
$$36 = 12x \tag{10}$$
$$x = 3 \tag{11}$$

$\therefore$ **The value of x is 3.**