Assignment 2
AI1110 : Probability and Random Variables

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Question: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:

TABLE I
RANDOM VARIABLE DECLARATION

Random Variable	Value	Event
X	0	not choosing black ball
	1	choosing black ball

The probability drawn ball is black is $\Pr(X = 1)$, which is $\frac{x}{12}$.

TABLE II
PROBABILITY IN DIFFERENT CASES

Event	Sample space	Favourable outcomes for choosing black	Probability of getting black
E_1 :before addition of 6 black balls	12	x	x/12
E_2 :after addition of 6 black balls	18	x+6	x+6/18

Given,

$$\Pr(E_2) = 2\Pr(E_1) \tag{1}$$

$$\frac{x+6}{18} = 2(\frac{x}{12}) \tag{2}$$

$$x + 6 = 3x \tag{3}$$

$$x = 3 \tag{4}$$

Therefore,the value of x is 3.