Assignment3

CS20Btech11035 -NYALAPOGULA MANASWINI

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https://github.com/N−Manaswini23/assignment3/blob/main/assignment3.py

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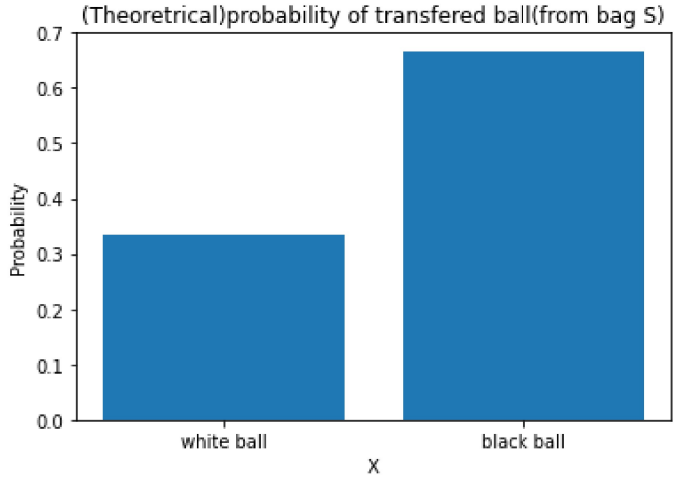
GATE XE-C QUESTION 17

Box-S has 2 white and 4 black balls and box-T has 5 white and 3 black balls.A ball is drawn at random from box-S and put in box-T.Subsequently,the probability of drawing a white ball from box-T is? (rounding off to 2decimal places)

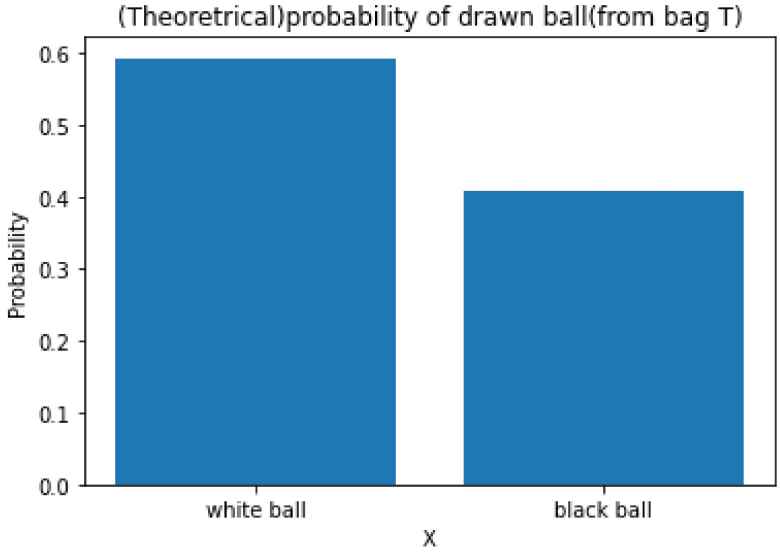
SOLUTION

Box-S has 2 white and 4 black balls.
Box-T has 5 white and 3 black balls.
Let A : Event of transfering white ball from box-S to box-T
Let B : Event of transfering black ball from box-S to box-T
Let C: Event of drawing white ball from box-T

$\Pr\left(\frac{C}{A}\right)$ =Probability of drawing whiteball from box-T after transfering white ball to box-T.



$\Pr\left(\frac{C}{B}\right)$ =Probability of drawing whiteball from box-T after transfering black ball to box-T.



$$\Pr(A) = \frac{1}{3} \tag{0.0.1}$$

$$\Pr(B) = \frac{2}{3} \tag{0.0.2}$$

$$\Pr\left(\frac{C}{A}\right) = \frac{6}{9} \tag{0.0.3}$$

$$\Pr\left(\frac{C}{B}\right) = \frac{5}{9} \tag{0.0.4}$$

From Baye's theorem

$$\Pr(\text{drawn ball is white}) = \Pr(C) \tag{0.0.5}$$

$$= \Pr\left(\frac{C}{A}\right) \times \Pr(A) + \Pr\left(\frac{C}{B}\right) \times \Pr(B) \tag{0.0.6}$$

Substiting (0.0.1),(0.0.2),(0.0.3),(0.0.4) in (0.0.6)

$$\Pr(C) = \frac{6}{9} \times \frac{1}{3} + \frac{5}{9} \times \frac{2}{3} \tag{0.0.7}$$

$$= \frac{16}{27} \tag{0.0.8}$$

$\therefore$ Probability of drawing white ball from box-T = $\Pr(C) = \frac{16}{27} = 0.59$