AI1103-Assignment 3

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Download all python codes from

https://github.com/asishcs2011010/demo/blob/main/assignment−3/assignment−3.py

and latex-tikz codes from

https://github.com/asishcs2011010/demo/blob/main/assignment−3/assignment−3(2).tex

QUESTION NO

GATE 2019 (IN), Q.3 (IN Engg. section)

QUESTION

A box has 8 red balls and 8 green balls . Two balls are drawn randomly in succession from the box without replacement. The probability that the first ball drawn is red and the second ball drawn is green is

1) $\frac{4}{15}$
2) $\frac{7}{16}$
3) $\frac{1}{2}$
4) $\frac{8}{15}$

SOLUTION

Given, 2 balls are drawn without replacement in quick succession
let $X \in \{0, 1\}$ be the random variable which denotes whether the picked up ball is red or green in the first draw.
1 represents picking up of red ball
0 represent picking up of green ball

X	$X = 0$	$X = 1$
Pr	8/16	8/16

(0.0.1)

let $Y \in \{0, 1\}$ be the random variable which denotes whether the picked up ball is red or green in the second draw.
1 represents picking up of red ball
0 represent picking up of green ball

The probability that the second ball drawn is green given that first ball drawn is red is = Pr(Y = 0|X = 1)= $\frac{8}{15}$

We know that

$$\Pr(X = x|Y = y) = \frac{\Pr(X = x, Y = y)}{\Pr(Y = y)} \tag{0.0.2}$$

The probability that the first ball drawn is red and the second ball drawn is green = Pr(X = 1,Y = 0)

$$\Pr(X = 1, Y = 0) = \Pr(X = 1) \times \Pr(Y = 0|X = 1) \tag{0.0.3}$$

$$\Pr(X = 1, Y = 0) = \frac{8}{16} \times \frac{8}{15} = \frac{4}{15} \tag{0.0.4}$$

Hence The probability that the first ball drawn is red and the second ball drawn is green =$\frac{4}{15}$ and correct answer is **Option (1)**