Assignment 2

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Download all python codes from

https://github.com/sujal100/Probability_and_Random_variable/tree/main/exercise_2/codes

and latex codes from

https://github.com/https://github.com/sujal100/Probability_and_Random_variable/blob/main/exercise_2/exercise_2_main_tex.tex

1 Problem [GATE-19]

A box contains 4 white balls and 3 red balls. In succession, two balls are randomly selected and removed from the box. Given that the first removed ball is white, the probability that the second removed ball is red is
(A) $\frac{1}{3}$ (B) $\frac{3}{7}$ (C) $\frac{1}{2}$ (D) $\frac{4}{7}$

2 Solution

No of white balls = 4, no of red balls = 3.
If first removed ball is white then remaining number of balls = 6(3 white, 3 red).
Consider, Bernoulli random variables Say X_1 and X_2

$Pr(X_1 = 1)$	will refer to probability of First remove ball is White.
$Pr(X_1 = 0)$	will refer to probability of First remove ball is Red.
$Pr(X_2 = 1)$	will refer to probability of Second removed ball is White.
$Pr(X_2 = 0)$	will refer to probability of Second removed ball is Red.

TABLE 0: Table for Bernoulli random variables.

Since, $X_1 \& X_2$ are independent events.
So,

$$Pr(X_1 = 1, X_2 = 2) = Pr(X_1 = 1)Pr(X_2 = 2) \tag{2.0.1}$$

And, required probability is

$$Pr(X_1 = 1|X_2 = 2) = \frac{Pr(X_1 = 1, X_2 = 2)}{Pr(X_2 = 2)} \tag{2.0.2}$$

$$= \frac{Pr(X_1 = 1)Pr(X_2 = 2)}{Pr(X_2 = 2)} = Pr(X_1 = 2) \tag{2.0.3}$$

We have 6 balls, one ball can be choose in ${}^6C_1$ ways, Since there are three red balls so probability that the second ball is red is $Pr(X_1 = 1)$
$= {}^6C_1/{}^3C_1$
$= 3/6$
$= 1/2$
Hence (C) is correct option.