AI1103 ASSIGNMENT 1

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Download the python code from

https://github.com/sarandeepmannam/AI1103Assignment1/blob/main/Assignment1.py

and latex-tikz code from

https://github.com/sarandeepmannam/AI1103Assignment1/blob/main/Assignment1.tex

1 Problem-2.16

An urn contains 10 black and 5 white balls.Two balls are drawn from the urn one after the other without replacement.What is the probability that both balls are black?

2 Solution-2.16

Let X be a random variable taking two values 0 and 1.
X=0 iff first ball picked is black and X=1 iff first ball picked is white.
Let Y be another random variable taking two values 0 and 1.
Y=0 iff second ball picked is black and Y=1 iff second ball picked is white.
We are required to find the probability of both the first and second balls to be black.
The probability of taking first ball as black will be,

$$P(X=0)=\frac{10}{15}=\frac{2}{3} \tag{2.0.1}$$

The probability of taking second ball as black given first ball taken was black will be,(Taking a black ball from urn containing 9 black and 5 white balls)

$$P(Y=0|X=0)=\frac{9}{14} \tag{2.0.2}$$

By the definition of conditional probability,

$$P(Y=0|X=0)=\frac{P(X=0,Y=0)}{P(X=0)} \tag{2.0.3}$$

from equations (2.0.1),(2.0.2) and (2.0.3)

$$P(X=0,Y=0)=P(X=0)\times P(Y=0|X=0) \tag{2.0.4}$$

$$\implies P(X=0,Y=0)=\frac{3}{7}=0.428571428571.. \tag{2.0.5}$$

Hence,the required probability is 0.428571