

Assignment 9

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Download all python codes from

<https://github.com/tanmaygoyal258/AI1103---Probability/tree/main/Assignment9/code.py>

and latex-tikz codes from

<https://github.com/tanmaygoyal258/AI1103---Probability/blob/main/Assignment9/main.tex>

1 PROBLEM

An urn has 3 red and 6 black balls. Balls are drawn at random one by one without replacement. The probability that second red ball appears on fifth draw is:

- 1) $\frac{1}{9!}$
- 2) $\frac{4!}{9!}$
- 3) $4 \left(\frac{6!4!}{9!} \right)$
- 4) $\frac{6!4!}{9!}$

2 SOLUTION

To obtain a second red ball at the fifth draw, the first 4 trials should involve drawing only 1 red ball out of the 3 and 3 black balls out of the 6. Probability of this happening:

$$\frac{{}^3C_1 {}^6C_3}{{}^9C_4} \quad (2.0.1)$$

The probability of the fifth ball turning out to be red is:

$$\frac{{}^2C_1}{{}^5C_1} \quad (2.0.2)$$

By Multiplication rule, total probability:

$$\frac{{}^3C_1 {}^6C_3 {}^2C_1}{{}^5C_1 {}^9C_4} = \frac{3! \times 6! \times 2! \times 4! \times 4! \times 5!}{2! \times 3! \times 3! \times 5! \times 9!} \quad (2.0.3)$$

$$= 4 \left(\frac{4!6!}{9!} \right) \quad (2.0.4)$$