Assignment 7

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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 appears at fifth draw.

A) $\dfrac{1}{9!}$

C) $4\left(\dfrac{6!4!}{9!}\right)$

B) $\dfrac{4!}{9!}$

D) $\dfrac{6!4!}{9!}$

2 SOLUTION

For the first four draws, 1 red ball out of the 3 and 3 black balls out of the 6 must appear; the probability this happens is :

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

The probability that second red appears at fifth draw is :

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

Therefore the total probability is (from (2.0.1) and (2.0.2)):

$$= \frac{{}^3C_1 {}^6C_3 {}^2C_1}{{}^5C_1 {}^9C_4} \qquad (2.0.3)$$

$$= \frac{3! \times 6! \times 2! \times 4! \times 4! \times 5!}{2! \times 3! \times 3! \times 5! \times 9!} \qquad (2.0.4)$$

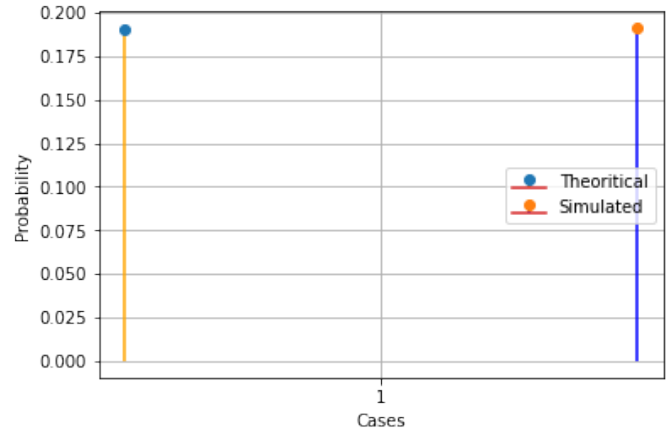$$= 4\left(\frac{4!6!}{9!}\right) \qquad (2.0.5)$$

So, the correct option is (C)

Fig. 4: Simulation and Theoretical Comparison