

Probability&RV

Assignment-04

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download Python code from

https://github.com/Anuradha-Uggi/Assignments-AI5002-Probability-and-Random-Variables/blob/main/Prob_ass04/rvsp_urn_balls.py

Download Latex code from

https://github.com/Anuradha-Uggi/Assignments-AI5002-Probability-and-Random-Variables/blob/main/Prob_ass04/UrnBalls.tex

I. QUESTION

Six balls are drawn successively from an urn containing 7 red and 9 black balls. Tell whether or not the trials of drawing balls are Bernoulli trials when after each draw the ball drawn is

- (i) replaced
- (ii) not replaced in the urn.

II. SOLUTION

Properties to be satisfied if a trial needs to be a Bernoulli trial:

- 1) Number of trials should be finite.
- 2) each trial should have outcomes of success and failure.
- 3) if P is the success probability then failure probability should be 1-P
- 4) probability of success should not vary with trial

Case(i):Replaced

Number of red balls = 7

Number of black balls = 9

let X be the random variable and

- X=1 is success which is Drawing red ball
- X=0 is Failure which is Drawing black ball

Success Probability

$$P(X = 1) = \frac{7}{16} \quad (1)$$

Failure Probability

$$P(X = 0) = \frac{9}{16} = 1 - P(X = 1) \quad (2)$$

Success Probability is constant for all Trials. as X satisfies all properties of Bernoulli therefore Trials are Bernoulli Trials.

Case(ii):Not Replaced

In this case Success Probability is

$$P(X = 1) = \frac{7}{16} \quad (3)$$

for Second Trial

$$P(X = 1) = \frac{6}{15} \quad (4)$$

Corresponding Failure Probabilities are

$$P(X = 0) = \frac{9}{16} \quad (5)$$

and for 2nd trial

$$P(X = 0) = \frac{8}{15} \quad (6)$$

probability of success and corresponding failure is varying with trials therefore these are not Bernoulli Trials.

III. CONCLUSION

- Case(i):Trials are Bernoulli Trials
- Case(ii): Trials are not Bernoulli Trials