Probability&RV Assignment-03

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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

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

I. QUESTION(Prob-3,8)

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 utcomes 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 in all trials.

case(i):Replaced

Number of red balls = 7
Number of black balls = 9
let X be the random variable that indicates probability of success and failure.

let P(x=1) is the probability of success lets take it as picking a red ball.

and P(x=0) is the probability of failure lets take it as picking a black ball.

$P(x = 1) = \frac{7}{16}$ and its same for any red ball drawn since the drawn ball is replaced.
$P(x = 0) = \frac{9}{16} = 1 - P(x = 1)$
so it satisfies all properties of Bernoulli therefore Trials under Replaced case are Bernoulli Trials.

case(ii):Not Replaced

$P(x = 1) = \frac{7}{16}$ and for 2nd trial $P(x = 1) = \frac{6}{15}$ similarly
$P(x = 0) = \frac{9}{16}$ and for 2nd trial $P(x = 0) = \frac{8}{15}$ so here the probability of success and corresponding failure is varying in each trial therefore under Not Replaced case Trials are not Bernoulli Trials.

III. CONCLUSION

Case(i):Drawn balls are Replaced into the Urn

Trials are Bernoulli Trials

Case(ii):Drawn balls are not Replaced

Trials are not Bernoulli Trials.