

Comment on computer assignment 3.

It is best to read through the assignment and attempt the exercises before trying to write a program. This would include reading the appendices. Further, to facilitate this an approach to responding to the first exercise is provided below.

A box of 100 ornamental light bulbs contains 40 green and 60 red bulbs. Four are selected at random. Find the probability that three are red, assuming that the sampling is done (a) with replacement and (b) without replacement.

How do we approach the solution and just as important how do we use it?

For 'a' the paradigm is with replacement and this calls for the binomial RV with the probability of success being constant. Hence, the probability of red is the ratio of reds to the total population.

Let the RV X denote the number of reds in the sample of four.

$$P(\text{red}) = \frac{60}{100} = 0.6; p = 0.6. n = 4 \text{ and } x = 3.$$

$$P(\{X = 3\}) = {}_4C_3 (0.6)^3(0.4) = 0.3456$$

For 'b' the paradigm is without replacement and this calls for the hypergeometric RV with the probability not being constant. We can use the *urn* approach.

Let the RV X denote the number of reds in the sample of four.

$$P(\{X = 3\}) = \frac{{}_{60}C_3 \cdot {}_{40}C_1}{{}_{100}C_4} = 0.3491$$

These two different paradigms give results that are in agreement to the hundredths because the sample size relative the population results in the two distributions being similar.

A possible error function would be $E = |0.3456 - 0.3491| = 0.0035$.