

QM-1B

Assignment – 3

1. The file iris.csv gives data about the length and width of sepals and petals of three species of Iris. Consider the given data as the sampling frame.
 - (a) Draw an SRSWOR of size 30 from the given population and use it to estimate the population means of the sepal length, sepal width, petal length and petal width. Also obtain the estimated standard error of the estimates.
 - (b) Consider the three species as three strata of the population. Draw a stratified sample of size 30 using proportional allocation and use it to estimate the population means of the sepal length, sepal width, petal length and petal width. Also obtain the estimated standard error of the estimates.
 - (c) From an earlier survey it is known that the standard deviations of the Sepal Lengths of the three species setosa, versicolor and virginica are 0.35, 0.52 and 0.64 respectively. Find the optimum allocation of a sample of size 30 in the three strata assuming equal cost. Now obtain the estimate of the population mean of the sepal length and its estimated standard error.
2. The file crictest.csv gives some batting data about test cricketers for the period 1877-2019. This serves as the sampling frame for this exercise. This cricketers' may be divided into six strata depending on their starting year 1877-1899, 1900-1914, 1920-1939, 1947- 1974, 1975-1999, and 2000-2019.
 - (a) Draw a stratified random sample of size 60 from this sampling frame.
 - (b) Use this sample to estimate the population means of Runs scored, Ave, 100's and 50's.
 - (c) Obtain the estimated standard errors of the above estimates.
 - (d) Draw a stratified systematic sample of size 60 from this population by choosing 10 players from each strata using systematic sampling.
 - (e) Use this sample to estimate the population means of Runs scored, Ave, 100's and 50's.
 - (f) Use Koop's method to obtain the estimated standard error of the sample mean of Runs scored, Ave, 100's and 50's of each strata.
 - (g) Use the information in (f) to obtain the estimated standard error of the estimates of the population means of Runs scored, Ave, 100's and 50's.
3. The file clt1.csv gives a random sample of size from a probability distribution.
 - (a) Draw a random sample of size 40 using SRSWR from this data and compute the sample mean.
 - (b) Use the Central Limit Theorem to compute the following probabilities:
 - i. $P(\bar{X}_{40} \leq 1.35)$
 - ii. $P(\bar{X}_{40} > 2.68)$
 - iii. $P(1.9 \leq \bar{X}_{40} \leq 2.1)$
4. In a certain population, weights of individuals (in Kgs) are observed to follow a distribution with mean 60 and standard deviation 15. An elevator manufacturing company wants to build a large elevator for a busy shopping mall that can carry 50 persons at a time. It wants to design the elevator in a such a way that the chance of the total weight of 50 individuals exceeding the maximum permitted weight is 0.001. What should be the maximum permitted weight of the elevator?

5. A small store near a school gets 100 customers on a typical school day. The number of candies bought by a customer is given by the following distribution:

X:	1	2	3	4	5
P(X=x):	0.3	0.4	0.05	0.2	0.05

If he wants to satisfy the demand of all the customers with probability of 0.9, how many candies should he stock?