1.Define simple random sampling. Give the name of 2 methods of simple random sampling?

Simple random sampling is a type of probability sampling in which the researcher randomly selects a subset of participants from a population. Each member of the population has an equal chance of being selected. Data is then collected from as large a percentage as possible of this random subset. Simple random sampling, Cluster sampling, systematic sampling, stratified sampling are the methods.

Lottery Method: In this method, each member of the population is assigned a unique number, and a random number generator is used to select the required number of samples. For example, if we want to select a sample of 100 from a population of 1000, we would assign a number to each member of the population from 1 to 1000, and then use a random number generator to select 100 numbers.

Random Table Method: In this method, a table of random numbers is used to select the samples. The table contains a list of random digits from 0 to 9, and each digit has an equal probability of occurring. To select a sample using this method, we start at a random point in the table and read off the digits in the table until we have selected the required number of samples.

2. When do we go for stratified random sampling?

Stratified random sampling is a useful sampling technique to use when the population being studied has subgroups or strata that are important to consider in the research. Some situations where stratified random sampling may be appropriate include:

1.When the population has identifiable subgroups: If the population being studied can be divided into subgroups based on specific characteristics, then stratified random sampling can be used to ensure that each subgroup is adequately represented in the sample.

2.When subgroups have different characteristics: If the subgroups within the population have different characteristics that might impact the research outcomes, then stratified random sampling can help to ensure that the sample is representative of each subgroup.

3. what are the advantages of simple random sampling?

Simple random sampling is a popular sampling technique in research where each individual or element in the population has an equal chance of being selected for the sample. The advantages of simple random sampling include:

Unbiased: Simple random sampling is an unbiased sampling method that ensures that each individual in the population has an equal chance of being selected for the sample. This eliminates any potential bias in the sample selection process and ensures that the sample is representative of the population.

Easy to implement: Simple random sampling is easy to implement and understand. It does not require any special knowledge or expertise, and can be carried out using simple random number generators or computer software.

Probability-based: Simple random sampling is a probability-based sampling method that allows researchers to calculate the probability of each individual in the population being selected for the sample. This helps to ensure that the sample is representative of the population and that statistical inferences can be made with confidence.

Reduces sampling error: Simple random sampling reduces sampling error, which is the difference between the sample statistic and the population parameter. By selecting a sample at random, researchers can reduce the impact of chance on the sample selection process and minimize sampling error.

Versatile: Simple random sampling can be used in a wide range of research designs, including experimental and non-experimental designs, as well as qualitative and quantitative research.

4. 4) A diameter of a component produced on a semiautomatic machine is known to be distributed normally with a mean of 10 mm and a standard deviation of 0.1 mm. If a random sample of size 5 is picked up, what is the probability that the sample mean will be between 9.95 mm and 10.05mm?

$u = 10, \sigma = 0.1, n = 5$

$P(9.95 \leq \bar{x} \leq 10.05) = 2 \times P(10 \leq \bar{x} \leq 10.05)$

$= 2 \times P([(10 - u)/ \sigma/\sqrt{n}] \leq \bar{x} \leq [(10.05 - u)/ \sigma/\sqrt{n}])$

$= 2 \times P(0 \leq Z \leq 1.112) = 2 \times 0.3686 = 0.7372$

The probability that the sample mean will be between 9.95 mm and 10.05mm is 73.7 % (app.)

5. The time between arrival of two queuing systems is normally distributed with a mean of 2 minutes and standard deviation of 0.25 minutes. If a random sample of 36 is drawn, what is the probability that the sample mean will be greater than 2.1 minutes.

u = 2, σ = 0.25, n = 36

$Z = (337000 - 340000) / (20000/ \sqrt{50}\ ) = 0.042$

$P(\ \bar{x} \geq 2.1) = P(Z \geq [(2.1 - 2) / 0.042]) = P(Z \geq 2.38) = 0.5 - 0.4913 = 0.0087$

The probability that the sample mean will be greater than 2.1 minutes is 0.87 % (app.)

6. A company produces mobile phones of 800 mm height with a standard deviation of 300mm. A random sample of 16 items are drawn from the process. What is the probability that the sample mean will exceed 900 mm.

u = 800, σ = 300, n = 16, $\bar{x} = 900$

$Z = 900 - 800 / (300 / \sqrt{16}) = 400/300 = 1.33$

$P(\ \bar{x} \geq 900) = P(\ Z \geq 1.33) = 1 - P(Z \leq 1.33) = 1 - 0.9082 = 0.0918$

The probability that the sample mean will exceed 900 mm is 9.18 % (app.)

7. An auditor takes a random sample of size n = 36. From a population of 1000 accounts. Mean of the population of Rupees 260, and standard deviation is 45. What is the probability that the sample mean will be less than 250?

$n = 36$, $u = 260$, $\sigma = 45$, $\bar{x} = 250$

$Sx = 45/\sqrt{36} = 7.5$

$Z = 250 - 260 / 7.5 = -1.33$

$P(\bar{x} < 250) = P(Z < -1.33) = 1 - P(Z < 1.33) = 1 - 0.9082 = 0.0918$

The probability that the sample mean will be less than 250 is 9.18 % (app.)

8. 8) In a particular cola company 5000 employees are on average 58 years old with a standard deviation of 8 years old. If a random sample of 50 people are taken, what is the probability that their average age will be less than 60 years.

$u = 58$, $\sigma = 8$, $\bar{x} = 60$, $n = 50$

$Sx = 8 / \sqrt{50} = 1.13$

$Z = 60 - 58 / 1.13 = 1.77$

$P(\bar{x} < 60) = P(Z < 1.77) = 0.9616$

The probability that their average age will be less than 60 years is 96.2 % (app.)