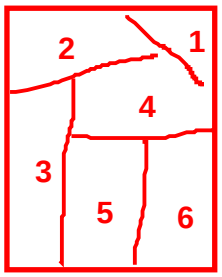
Sampling Techniques:

- **A simple random sample** of n measurements from a population is a subset of the population selected in such a manner that every sample of size n from the population has an equal chance of being selected.
  - No researcher bias occurs in the items selected for the sample.
  - A random sample may not always reflect the diversity of the population. For instance, from a population of 10 cats and 10 dogs, a random sample of size 6 could consist of all cats.
  - **Example:** we need to know if the emission systems of the latest shipment of Toyotas satisfy pollution-control standards. You want to pick a random sample of 30 cars from this shipment of 500 cars and test them. One way to pick a random sample is to number the cars 1 through 500. Write these numbers on cards, mix up the cards, and then draw 30 numbers. The sample will consist of the cars with the chosen numbers. If you mix the cards sufficiently, this procedure produces a random sample.

- **Stratified sampling:** Divide the entire population into distinct subgroups called *strata* (plural of stratum). The strata are based on a specific characteristic such as age, income, education level, and so on. All members of a stratum share the specific characteristic. Draw random samples from each stratum.
  - **Example:** One might divide a sample of adults into subgroups by age, like 18–29, 30–39, 40–49, 50–59, and 60 and above. To stratify this sample, the researcher would then randomly select proportional amounts of people from each age group.

- **Systematic sampling:** Number all members of the population sequentially. Then, from a starting point selected at random, include every kth member of the population in the sample.
  - **Example:** if you wanted to select a random group of 1,000 people from a population of 50,000 using systematic sampling, all the potential participants must be placed in a list and a starting point would be selected. Once the list is formed, every 50th person on the list (starting the count at the selected starting point) would be chosen as a participant, since 50,000/1,000 = 50.



- **Cluster sampling:** Divide the entire population into sections or clusters. Make a random selection of clusters. Include every member of each selected cluster in the sample.
  - **Example:** In conducting a survey of school children in a large city, we could first randomly select five schools and then include all the children from each selected school.

Population USA

Divide it to states

Select 5 states

Select 3 arbitrary Schools

- **Multistage Sampling:** Is the taking of samples in stages using smaller and smaller sampling units at each stage. Usually it's used when the population is very large or geographically spread out.
  - **Example: The goal is to to find out which subjects U.S. school children preferred.** A population list (a list of all U.S. schoolchildren) would be near-impossible to come by, so we cannot take a sample of the population.

    Instead, you divide the population into states and take a simple random sample of states. For the next stage, you might take a simple random sample of schools from within those states. Finally you could perform cluster sampling (which include all the students from each selected school)

Use Cluster to include the whole student

- **Convenience sampling:** Create a sample by using data from population members that are readily available.
  - **Example 1:** Standing at a mall or a grocery store and asking people to answer questions.
  - **Example 2:** Using student volunteers as individuals for the research.

EXAM QUESTION

Example 1. Management at a retail store is concerned about the possibility of drug abuse by people who work there. They decide to check on the extent of the problem by having a random sample of the employees undergo a drug test. Several plans for choosing the sample are proposed. Name the sampling strategy in each.

- Randomly select ten stores around the country and survey all the employees that work at those stores.

Cluster Sampling

- Choose the fourth person that arrives to work for each shift.

Systematic Sampling

- There are four employee classifications: supervisors, fulltime clerks, part-time clerks, and maintenance staff. Randomly select ten people from each category.

Stratified Sampling

- Each employee has a three-digit identification number. Randomly choose 40 numbers.

Simple Random Sampling

Example 2. Dr. Hani Aldirawi wants to know his students feel about his Stat course. He decides to administer a survey to a random sample of students taking his course. He has several sampling plans to choose from. Name the sampling strategy in each.

- There are four ranks of students taking the class; freshmen, sophomore, juniors, and seniors. Randomly select 15 students from each class rank

Stratified Sampling

- Randomly select a class rank (freshmen, sophomore, juniors, or seniors) and survey every student in that class rank

Cluster Sampling

- Each student has a student number, randomly chooses 60 numbers.

Simple Random Sampling