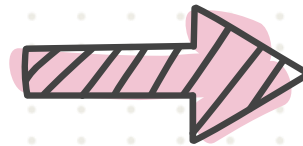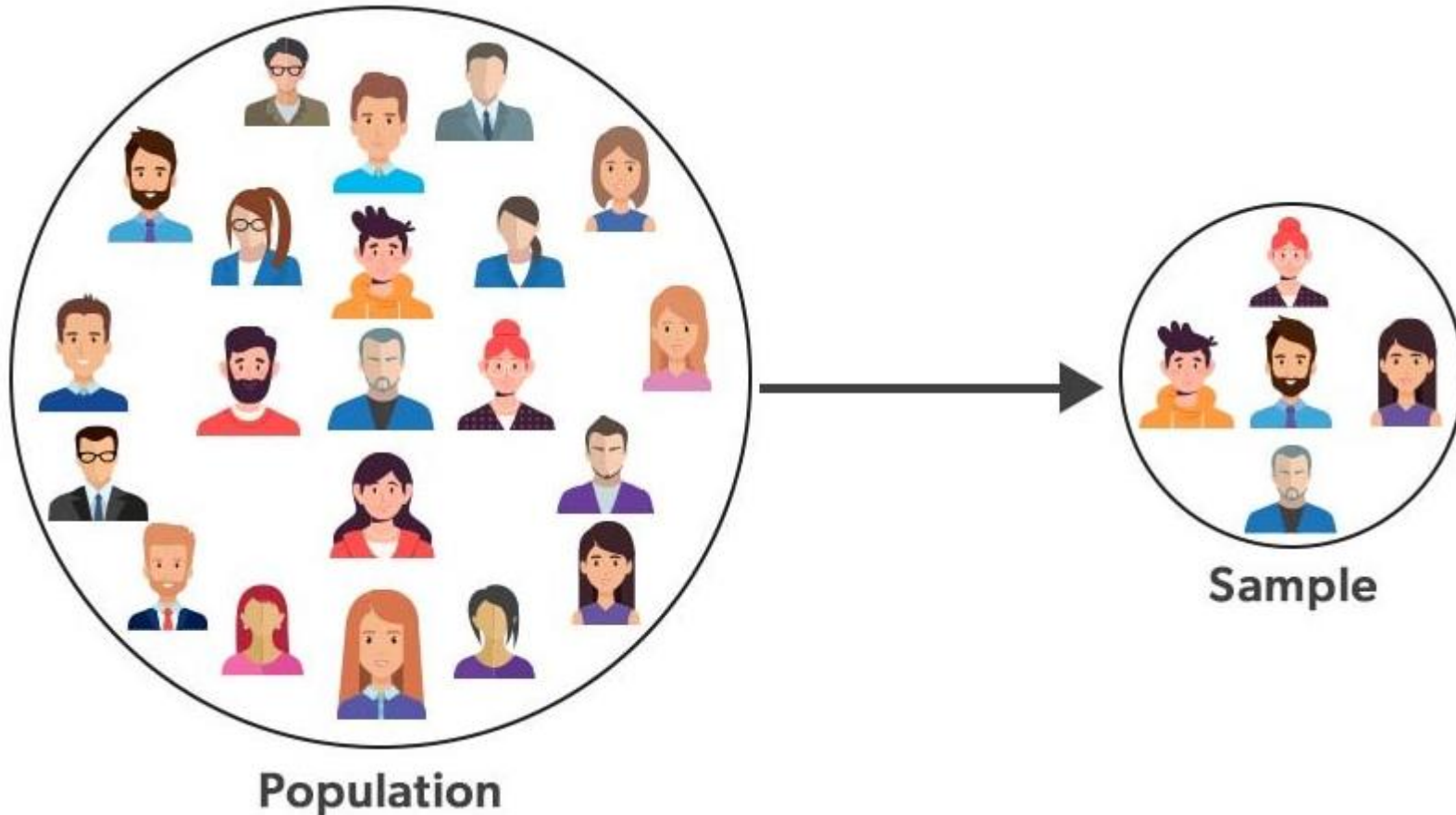# 1-3

# Data Collection & Sampling Techniques
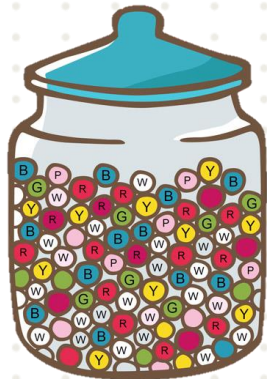
# Population VS Sample



Population

Sample

All the subjects (human or otherwise) that are being studied.

A group of subjects selected from a population.

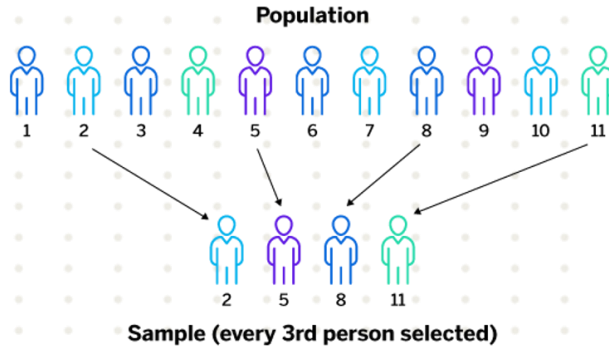# Sampling Techniques

**Random Sampling**

**Systematic Sampling**

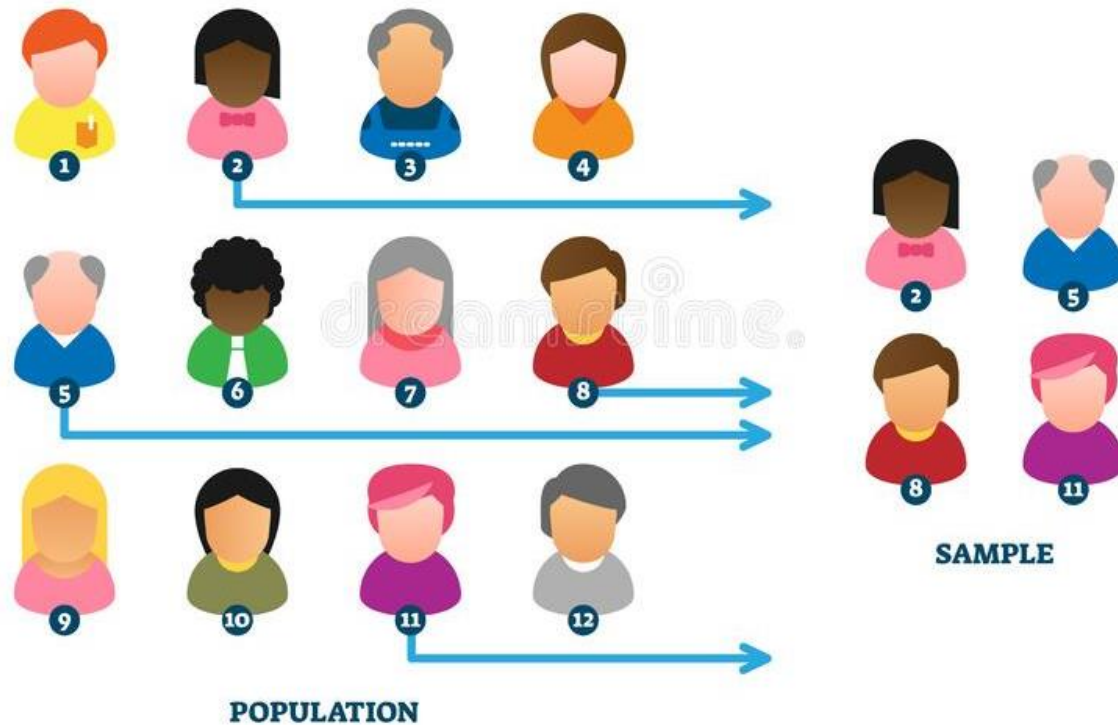**Stratified Sampling**

**Cluster Sampling**

**Population**

1 2 3 4 5 6 7 8 9 10 11

2 5 8 11

**Sample (every 3rd person selected)**

Group 1

Group 2

Group 3

Cluster 1

Cluster 2

Cluster 3

Cluster 4

Cluster 5

Single Stage Cluster Sampling
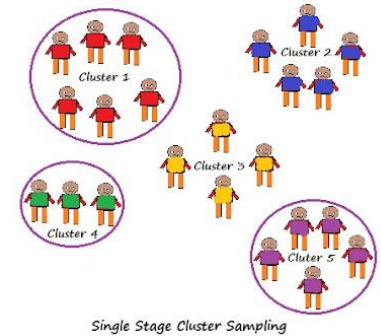
# Random Sampling



POPULATION
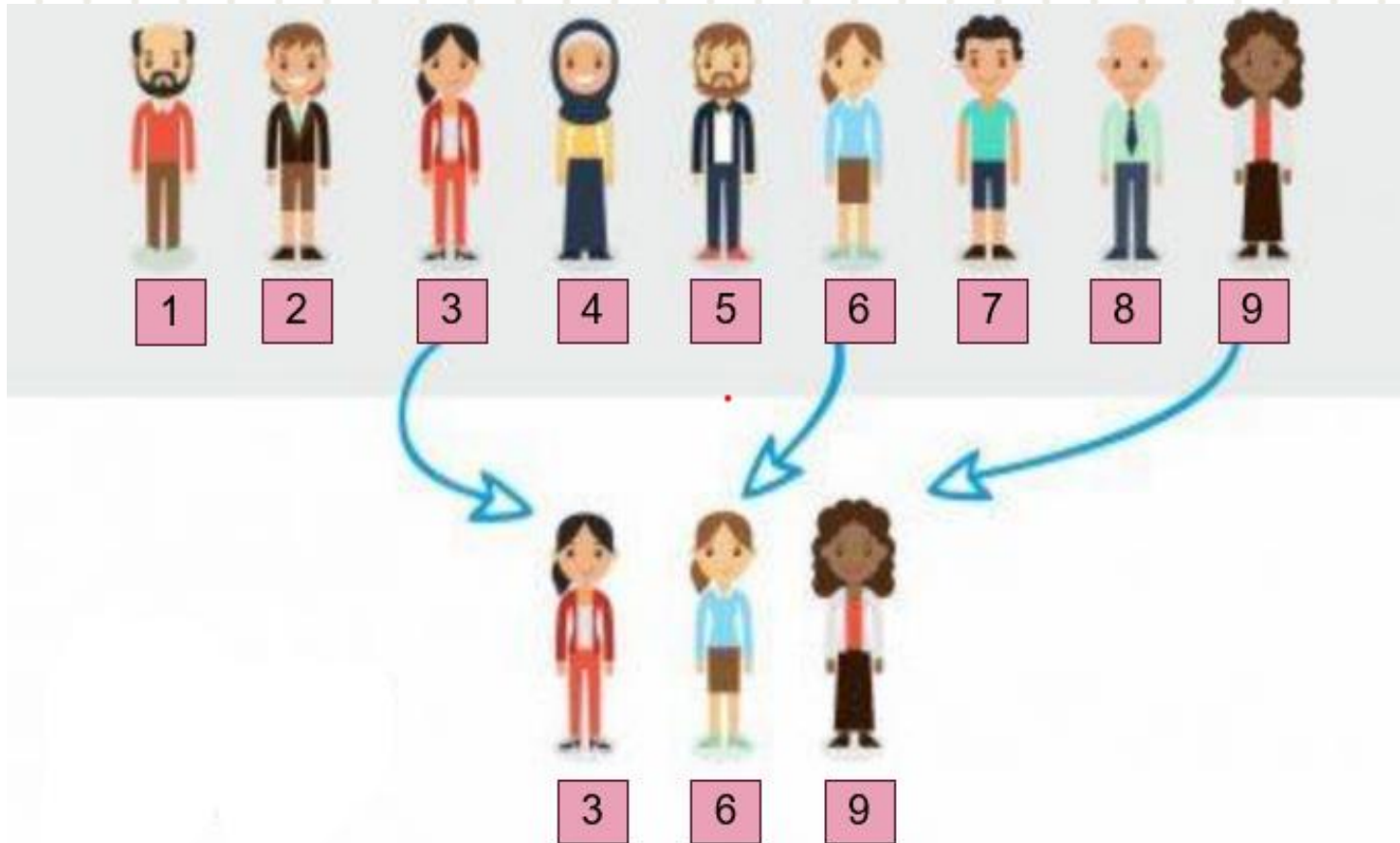
SAMPLE

A random sample is a sample in which all members of the population have an equal chance of being selected.

Random samples are selected by using chance methods or random numbers. One such method is to number each subject in the population. Then place numbered cards in a bowl, mix them thoroughly, and select as many cards as needed.
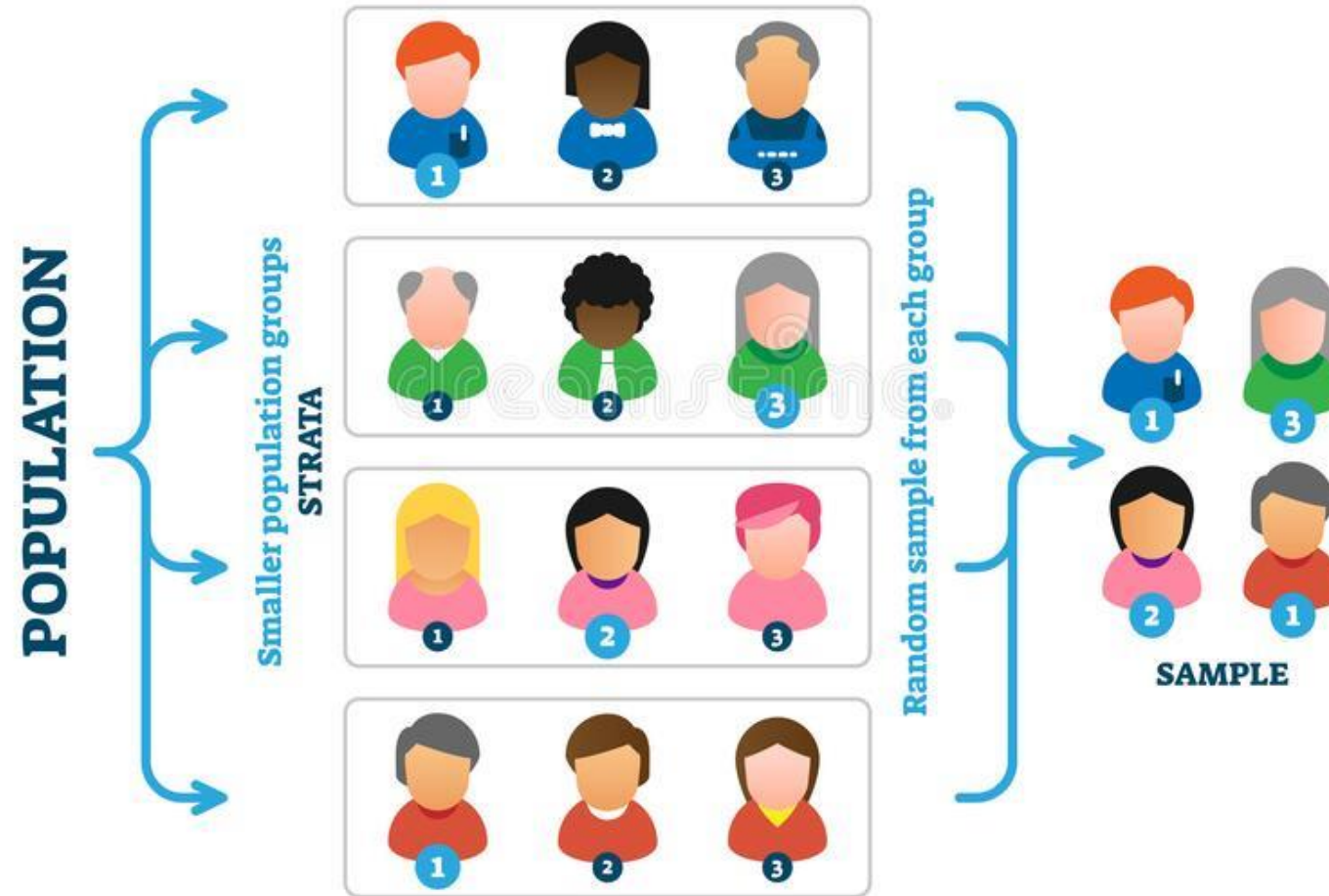
# Systematic Sampling



A ==systematic sample== is a sample obtained by selecting every Kth member of the population where K is counting number.

Researchers obtain systematic samples by numbering each subject of the population and then selecting every kth subject, the first subject will be selected at random.
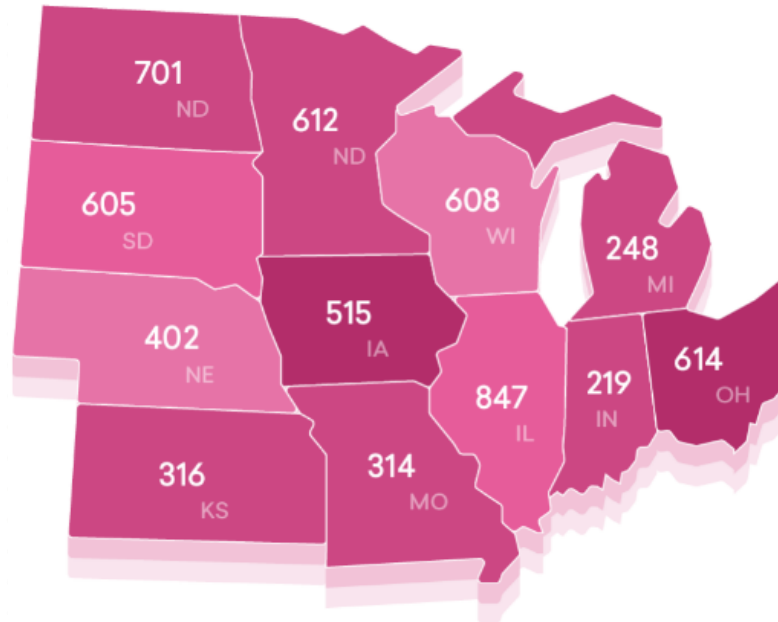
# STRATIFIED SAMPLING



A <mark>stratified sample</mark> is a sample obtained by dividing the population into subgroups or strata according to some characteristic relevant to the study. (There can be several subgroups) Then subjects are selected from each subgroup.
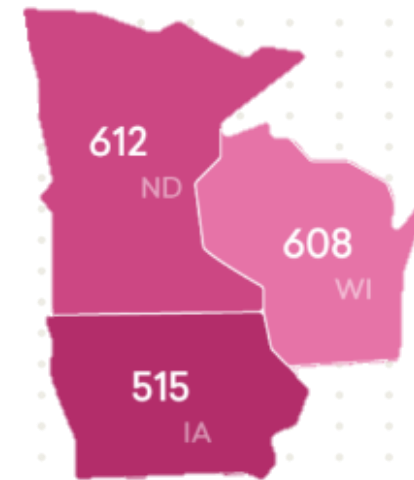Samples within the strata should be randomly selected.

# Cluster Sampling

**Population**

**Sample**

A <mark>cluster sample</mark> is obtained by dividing the population into sections or clusters and then selecting one or more clusters and using all members in the cluster(s) as the members of the sample.

Here the population is divided into groups called clusters by some means such as geographic area or schools in a large school district, etc.
Then the researcher randomly selects some of these clusters and uses all members of the selected clusters as the subjects of the samples.

# The difference between cluster and stratified sampling



Stratified random sampling
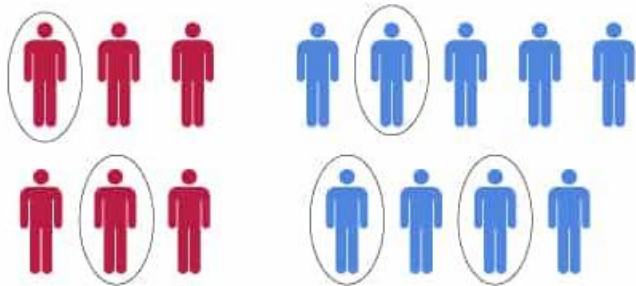
VS

Cluster sampling
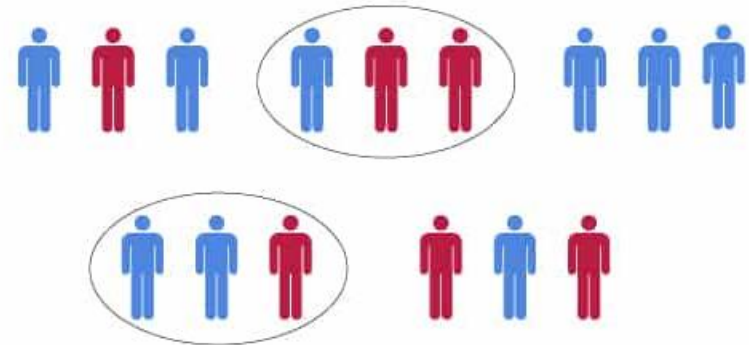
# Sampling Techniques

## Random Sampling

## Systematic Sampling

## Stratified Sampling

## Cluster Sampling

**Population**

1  2  3  4  5  6  7  8  9  10  11

**Sample (every 3rd person selected)**

2  5  8  11

Group 1

Group 2

Group 3

Cluster 1

Cluster 2

Cluster 3

Cluster 4

Cluster 5
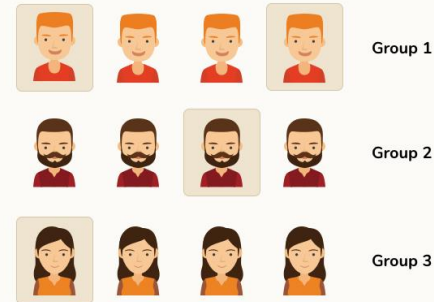
Single Stage Cluster Sampling
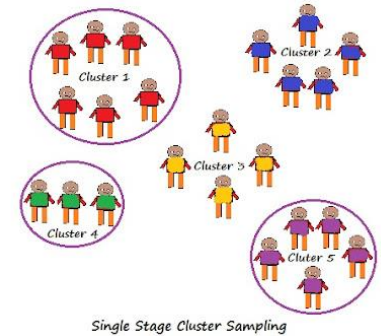
## TABLE 1-4
## Summary of Sampling Methods

| | |
|---|---|
| **Random** | Subjects are selected by random numbers. |
| **Systematic** | Subjects are selected by using every kth number after the first subject is randomly selected from 1 through k. |
| **Stratified** | Subjects are selected by dividing up the population into subgroups (strata), and-subjects are randomly selected within subgroups. |
| **Cluster** | Subjects are selected by using an intact subgroup that is representative of the population. |

# Example 1-5

| State which sampling method was used. | |
|---|---|
| a. Out of 10 hospitals in a municipality, a researcher selects one and collects records for a 24-hour period on the type of emergencies that were treated there. | |
| b. A researcher divides a group of students according to gender, major field, and low, average, and high-grade point average. Then she randomly selects six students from each group to answer questions in a survey. | |
| c. The subscribers to a magazine are numbered. Then a sample of these people is selected using random numbers. | |
| d. Every 10$^{th}$ bottle of Super-Duper Cola is selected, and the amount of liquid in the bottle is measured. The purpose is to see if the machines that fill the bottles are working properly. | |

# Exercises 1-2

| For exercise 11-16, identify the sampling method that was used. | |
|---|---|
| 11. To check the accuracy of a machine that is used for filling ice cream containers every 20th bottle is selected and weighed. | |
| 12. To determine how long people exercise, a researcher interviews 5 people selected from a yoga class, 5 people selected from a weight-lifting class, 5 people selected from an aerobic class and 5 people from swimming classes. | |
| 13. In a large school district, A researcher numbers all the full-time teachers and then randomly selects 30 teachers to be interviewed | |
| 14. In a medical research study, researcher selects a hospital and interviews all patients that day. | |
| 15. Customers in the Sunrise Coffee Shop are asked how much they spend on coffee per week. | |
| 16. Ten counties in Pennsylvania are randomly selected to determine the average country real estate tax that the residents pay. | |