

Quantitative Skills & Reasoning – Math 1001

Dr. Bob Brown, Jr.
Dean Emeritus
Professor Emeritus
East Georgia State College
Data Analysis Unit
Basics of Statistics pp 227-239 in textbook



Definitions

The **population** of a study is the group the collected data is intended to describe.

Everyone In The Group



Population in a Study

Examples:

1. Over eight million people living in New York City.
2. All Elephants in Africa
3. All Migrating Eagles in Alaska
4. All EGSC Students
5. All EGSC On-Line Students

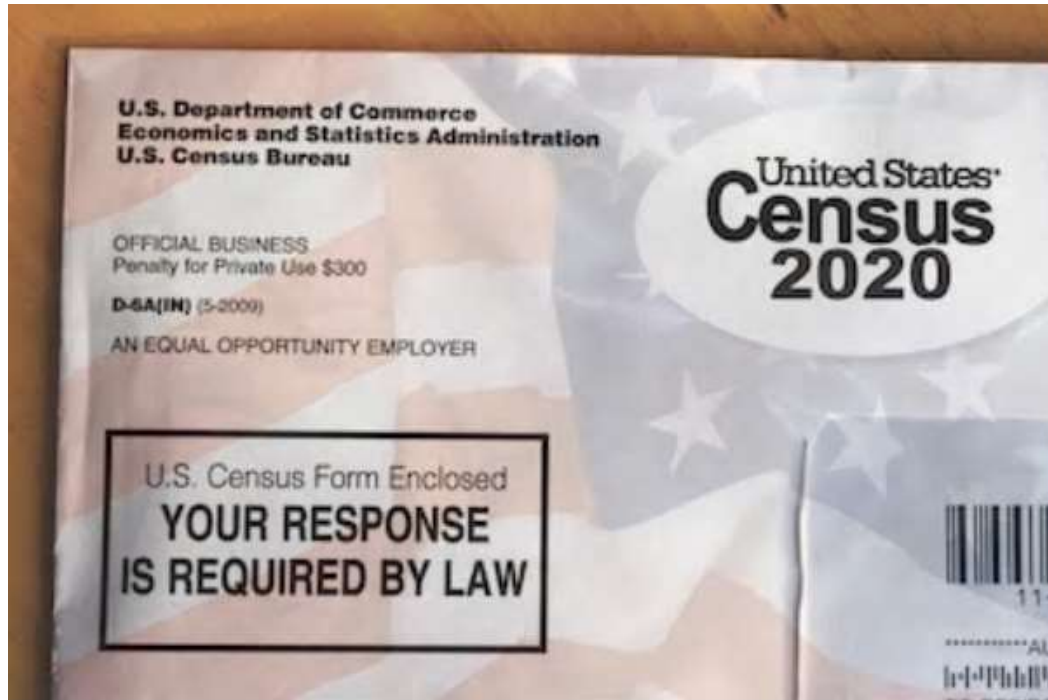
Definitions

A **parameter** is a value (average, percentage, etc.) calculated using **all the data from a population.**

Population parameters are not used very often since surveying an entire population is usually very time-consuming and expensive, unless the population is very small or we already have the data collected.

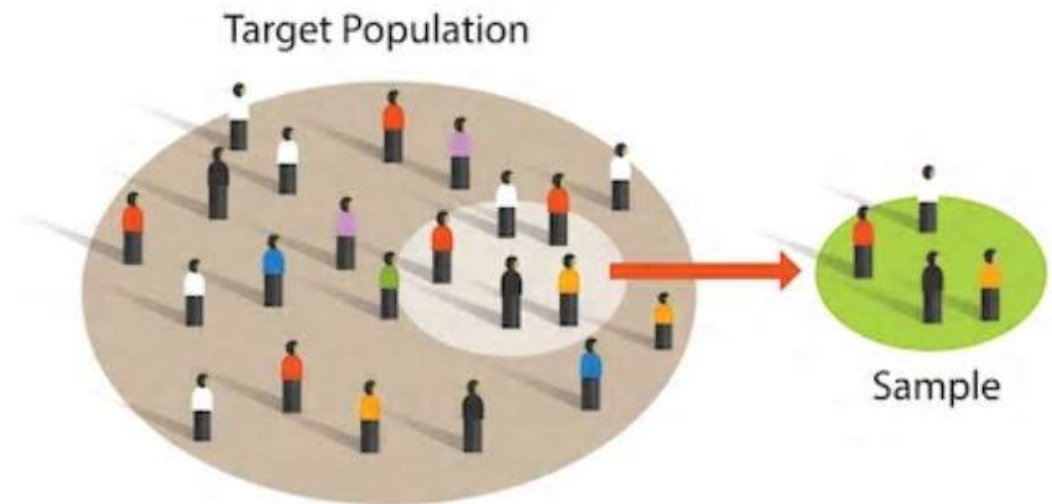
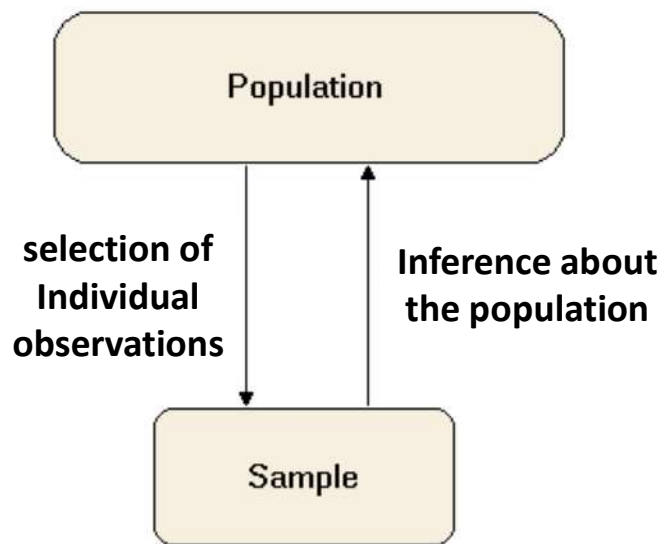
Definitions

A survey of an entire population is called a **census**.



Definitions

A **sample** is a smaller subset of the entire population, ideally one that is fairly representative of the whole population.



Definitions

A **statistic** is a value (average, percentage, etc.) calculated using the data from a sample.

Example

A newspaper website contains a poll asking people their opinion on a recent news article. What is the population?

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- The readers of the newspaper's website

Example

A college reports that the average age of its students is 28 years old. Is this a statistic or a parameter?

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- Parameter

Data Types

Categorical (qualitative) data are pieces of information that allow us to classify the objects under investigation into various categories.

Quantitative data are responses that are numerical in nature and with which we can perform meaningful arithmetic calculations.

Classify each measurement as categorical or quantitative.

ZIP codes

- **categorical**

Eye color of a group of people

- **categorical**

Daily high temperature of a city over several weeks

- **quantitative**

Annual income

- **quantitative**

Sampling Methods

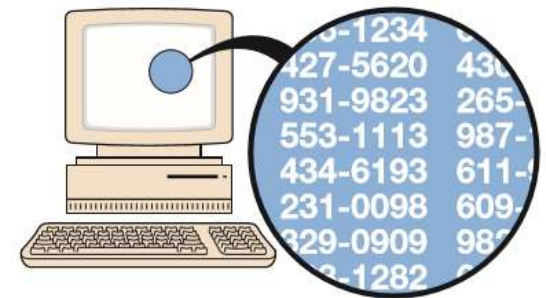
A sampling method is **biased** if every member of the population doesn't have equal likelihood of being in the sample.



A Lot of Voters Had No Phones

Sampling Methods

A **random sample** is one in which each member of the population has an equal probability of being chosen. A **simple random sample** is one in which every member of the population and any group of members has an equal probability of being chosen.



Sampling Methods

In **stratified sampling**, a population is divided into a number of subgroups (or strata). Random samples are then taken from each subgroup with sample sizes proportional to the size of the subgroup in the population.

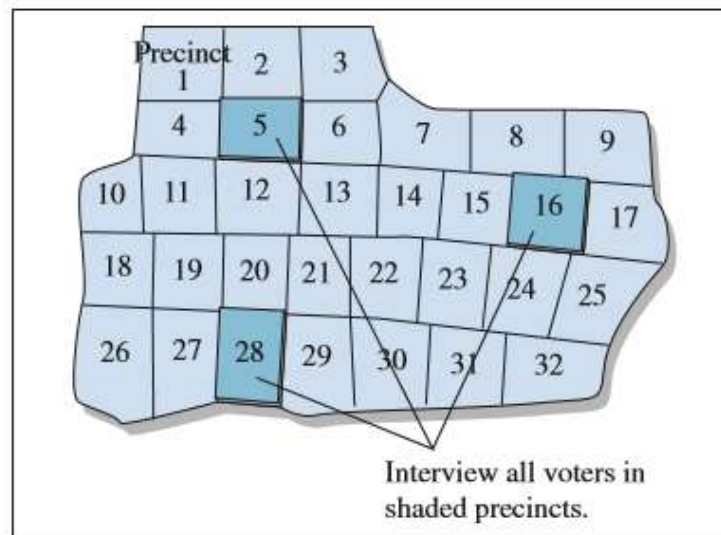


Sampling Methods

Quota sampling is a variation on stratified sampling, wherein samples are collected in each subgroup until the desired quota is met.

Sampling Methods

In **cluster sampling**, the population is divided into subgroups (clusters), and a set of subgroups are selected to be in the sample.



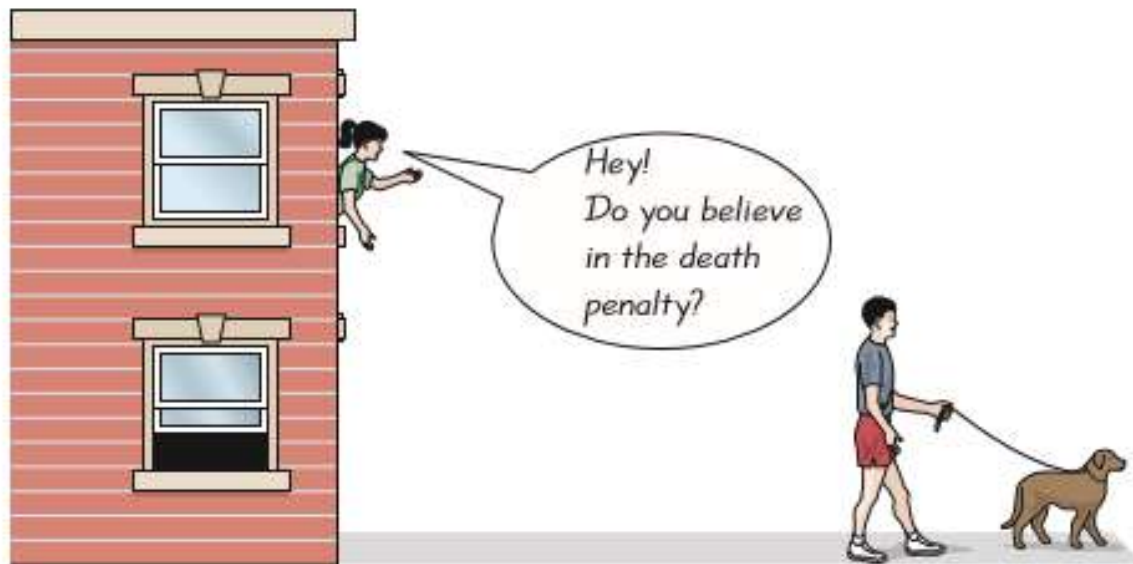
Sampling Methods

In **systematic sampling**, every n th member of the population is selected to be in the sample.



Sampling Methods

Convenience sampling is samples chosen by selecting whoever is convenient.



Sampling Methods

Voluntary response sampling is allowing the sample to volunteer.

Example: Voluntary satisfaction surveys are based on **customer or client satisfaction surveys**, through which a business or organization attempts to learn how recipients of a service feel about their interaction with the service provider. The customer may or may not complete the survey.

Identify which type of sampling was used.

A sample was selected to contain 25 men and 35 women

- a) random sample
- b) simple random sample
- c) stratified sampling 
- d) systematic sampling
- e) Convenience sampling
- f) Voluntary response sampling

Identify which type of sampling was used.

Viewers of a new show are asked to vote on the show's website

- a) random sample
- b) simple random sample
- c) stratified sampling
- d) systematic sampling
- e) Convenience sampling
- f) Voluntary response sampling



Identify which type of sampling was used.

Every 4th person in the class was selected

- a) random sample
- b) simple random sample
- c) stratified sampling
- d) systematic sampling 
- e) Convenience sampling
- f) Voluntary response sampling

Identify which type of sampling was used.

A website randomly sends a satisfaction survey to 50 of its users.

- a) random sample
- b) simple random sample 
- c) stratified sampling
- d) systematic sampling
- e) Convenience sampling
- f) Voluntary response sampling

Identify which type of sampling was used.

To survey voters in a town, a polling company randomly selects 10 city blocks, and interviews everyone who lives on those blocks.

- a) Cluster sampling 
- b) simple random sample
- c) stratified sampling
- d) systematic sampling
- e) Convenience sampling
- f) Voluntary response sampling

Observational Studies and Experiments

An **observational study** is a study based on observations or measurements.

Nothing is done with those in the study

An **experiment** is a study in which the effects of a **treatment** are measured.

Many new medical cures come from experiments
Scientific Discoveries & Other Breakthroughs Can Result