Business Statistics

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Brief Introduction of the lecturer

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In Today's Business World You Cannot Escape From Data

- In today's digital world ever increasing amounts of data are gathered, stored, reported on, and available for further study.
- You hear the word data everywhere.
- Data are facts about the world and are constantly reported as numbers by an ever increasing number of sources.

Each Business Person Faces A Choice Of How To Deal With This Explosion Of Data

- They can ignore it and hope for the best.
- They can count on other people's summaries of data and hope they are correct.
- They can develop their own capability and insight into data by learning about statistics and its application to business.

Statistics Is Evolving So Businesses Can Use The Vast Amount Of Data Available

The emerging field of Business Analytics makes "extensive use of:

- Data
- Statistical and quantitative analysis
- Explanatory & predictive models
- Fact based management

to drive decisions and actions."

What is Meant by Statistics?

- **Statistics** is the science of collecting, organizing, presenting, analyzing, and interpreting numerical data to assist in making more effective decisions.

Why Study Statistics?

- **Numerical information** is everywhere
- •2.5 EB bytes of data is created every day. •2,500,000,000,000,000,000 bytes
- •More than 30 million sensors are being used. •More than 5 billion people were using mobile phones in 2017.

Why Study Statistics?

- Today, there are 1.8 billion young people between the ages of 10 and 24 in the world.
- One point eight billion young women and young men are standing at the door of adulthood.
- Are they ready?
- Right now, too few of them are.

Why Study Statistics?

- Every month, 10 million young people reach working age. It's a staggering number. Some will go on for further education, but many will enter the workforce.
- And our world is not creating 10 million new jobs each month. The competition is fierce for the jobs that are available.
- So, imagine being a young person today, needing a job, seeking a livelihood, ready to build a future, and opportunities are hard to find.

Why Study Statistics?

- We are finding ourselves at a time in the world when the world is changing so fast for work.
- We're in the fourth industrial revolution.
- Young people do not want to be on the farms and in rural communities. They want to go to the cities.
- They want to learn future skills for future work.
- They want to learn digital technology.
- They want to learn business and entrepreneurship, so that they can create a business of their own.

Who Uses Statistics?

- A teacher?
- A researcher?
- A coach?
- A businessman?
- A government policy maker?
- etc...

Who Uses Statistics?

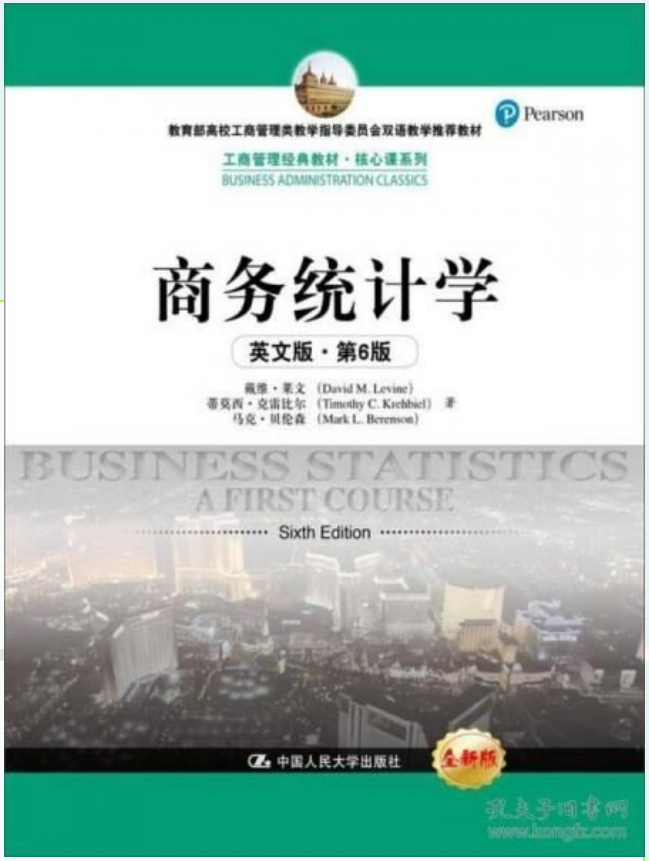
- Statistical techniques are used extensively by marketing, accounting, finance, quality control, consumers, professional sports people, hospital administrators, educators, politicians, physicians, etc...

How shall we learn for this lesson ?

- 1. To get the principal knowledge through the lesson. （Take down lecture notes)
- 2. To consolidate the knowledge through self-learning with supplementary materials, and by doing exercises after lesson.
- 3. To have discussions on the subject between students, or between students and the teacher in the lesson or after the lesson.
- **PPT & Textbook**

Asses sment

Business Statistics (6th Edition)
(美) 莱文, 克雷比尔, 贝伦森,
中国人民大学出版社, 2017.

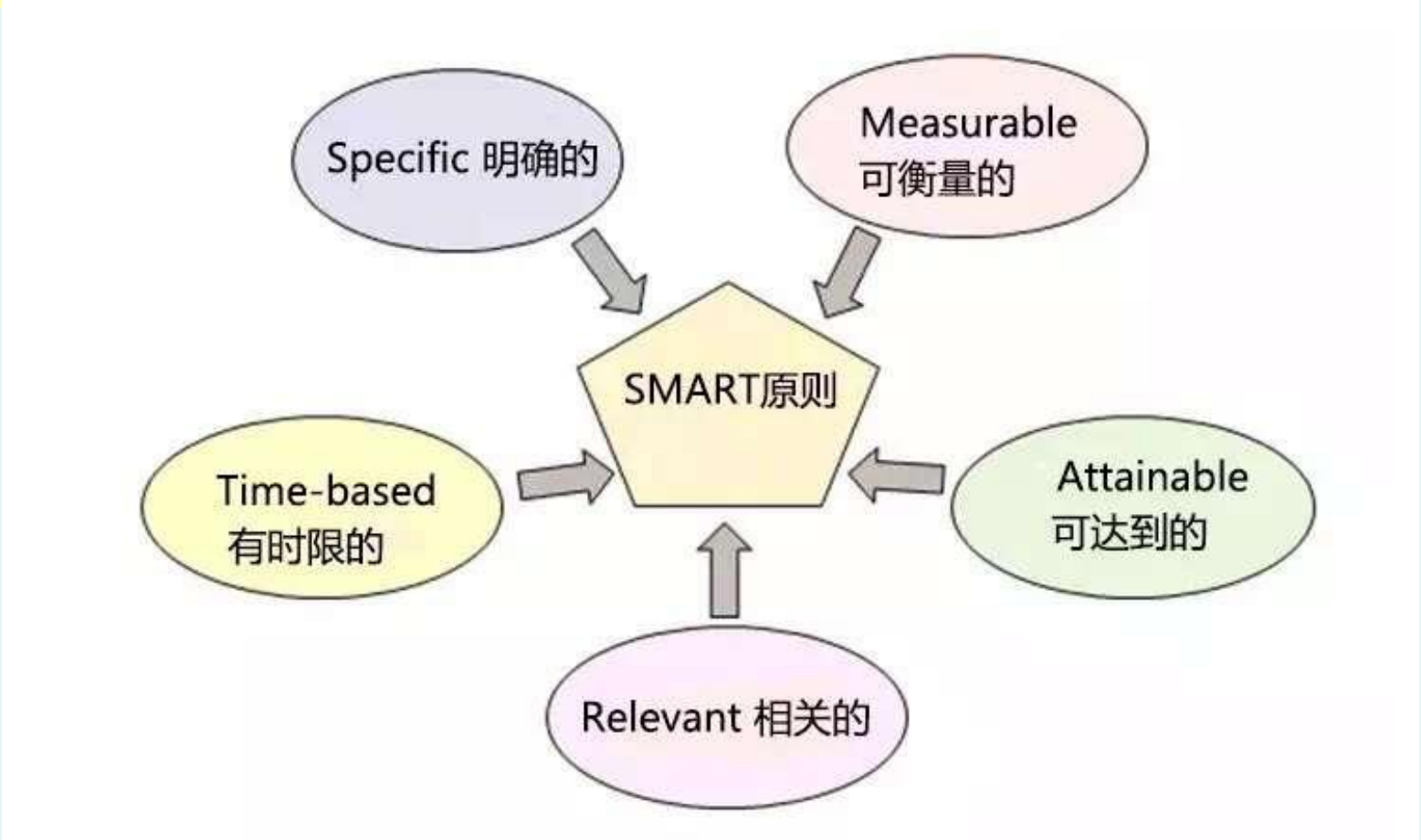


1. **Class Participation 10%**
2. **Test 10%**
3. **Homework/ Quiz 10%**
4. **Final Exam 70%**

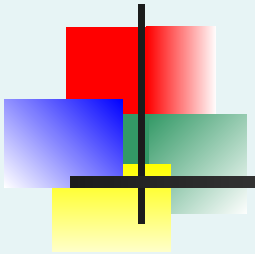
Total 100%

Your participation is warmly welcomed !

SMART


Specific 明确的
Measurable
可衡量的
SMART原则
Time-based
有时限的
Attainable
可达到的
Relevant 相关的

Business Statistics: A First Course
6th Edition



Chapter 1

Introduction

Learning Objectives

In this chapter you learn:

- What statistics is
- How statistics is fundamental to business
- The basic concepts and vocabulary of statistics

GOALS

- 1.Understand why we study statistics.
- 2.Explain what is meant by ***descriptive statistics*** and ***inferential statistics***.
- 3.Distinguish between a ***qualitative variable*** and a ***quantitative variable***.

4. Describe how a ***discrete variable*** is different from a ***continuous variable***.

In Business, Statistics Helps

- Transform numbers into useful information for decision makers
- Quantify & identify the risks in a business decision
- You understand and reduce the variation in a decision making process

Which is correct?

A. The data is . . .

B. The data are . . .

Which of the following is not a step in using statistics to make business decisions?

A. Plan

B. Repeat

C. Do

D. Report

Statistics can be used for

A. Assessing risk

B. Predicting results

C. Understanding our world

D. All of the above

Statistics is a way of reasoning.

A. True

B. False

Statistics helps us make sense of this so we can learn from data?

A. Variation

B. Constancy

C. Numbers

D. World

Which of the following is not an objective of *Business Statistics: A First Course 1/e* :

A. Develop the insights to think clearly about questions

B. Use tools to show what the data are saying

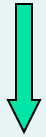
C. Give formulas to memorize

D. Acquire skills to interpret what it all means

Two Different Branches Of Statistics Are Used In Business

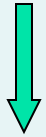
Statistics

Transforms data into useful information for decision makers.



Descriptive Statistics

Collecting, summarizing, visualizing, presenting and analyzing data



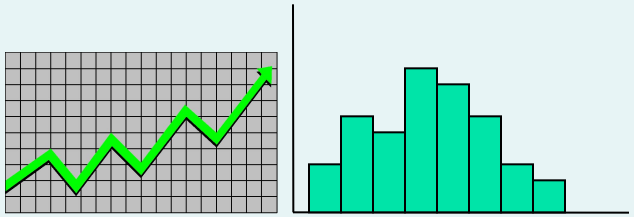
Inferential Statistics

Using data collected from a small group to draw conclusions about a larger group

Descriptive Statistics

- Collect data
  - e.g., Survey

- Summarize, visualize, present data
  - e.g., Tables and graphs



- Analyze data
  - e.g., The sample mean

Inferential Statistics

- Estimation
  - e.g., Estimate the population mean weight using the sample mean weight
- Hypothesis testing
  - e.g., Test the claim that the population mean weight is 120 pounds

Drawing conclusions about a large group of individuals based on a smaller group.

Understanding Statistics Enhances A Person's Numerical Literacy

- When do numbers presented represent useful information?
- When are differences in numbers presented meaningful versus simply due to chance?
- When are claims of causality in numbers presented valid?
- When are patterns observed in large amounts of data meaningful?

In Business, Statistics Plays A Fundamental & Important Role

- To visualize & summarize business data
  - Descriptive methods used to create charts & tables
- To draw conclusions from business data
  - Inferential methods used to reach conclusions about a large group based on data from a smaller group
- To make reliable forecasts about business activities
  - Inferential methods utilizing statistical models based on business data
- To improve business processes
  - Involves managerial approaches like Six Sigma

Two Trends Are Driving The Increasing Importance Of Statistics In Business

- The increasing amount of data that businesses can collect, store, & manage
- The increasing accessibility of computerized statistical tools

Basic Vocabulary Of Statistics

VARIABLE

A characteristic of an item or individual

DATA

The set of individual values associated with a variable

OPERATIONAL DEFINITIONS

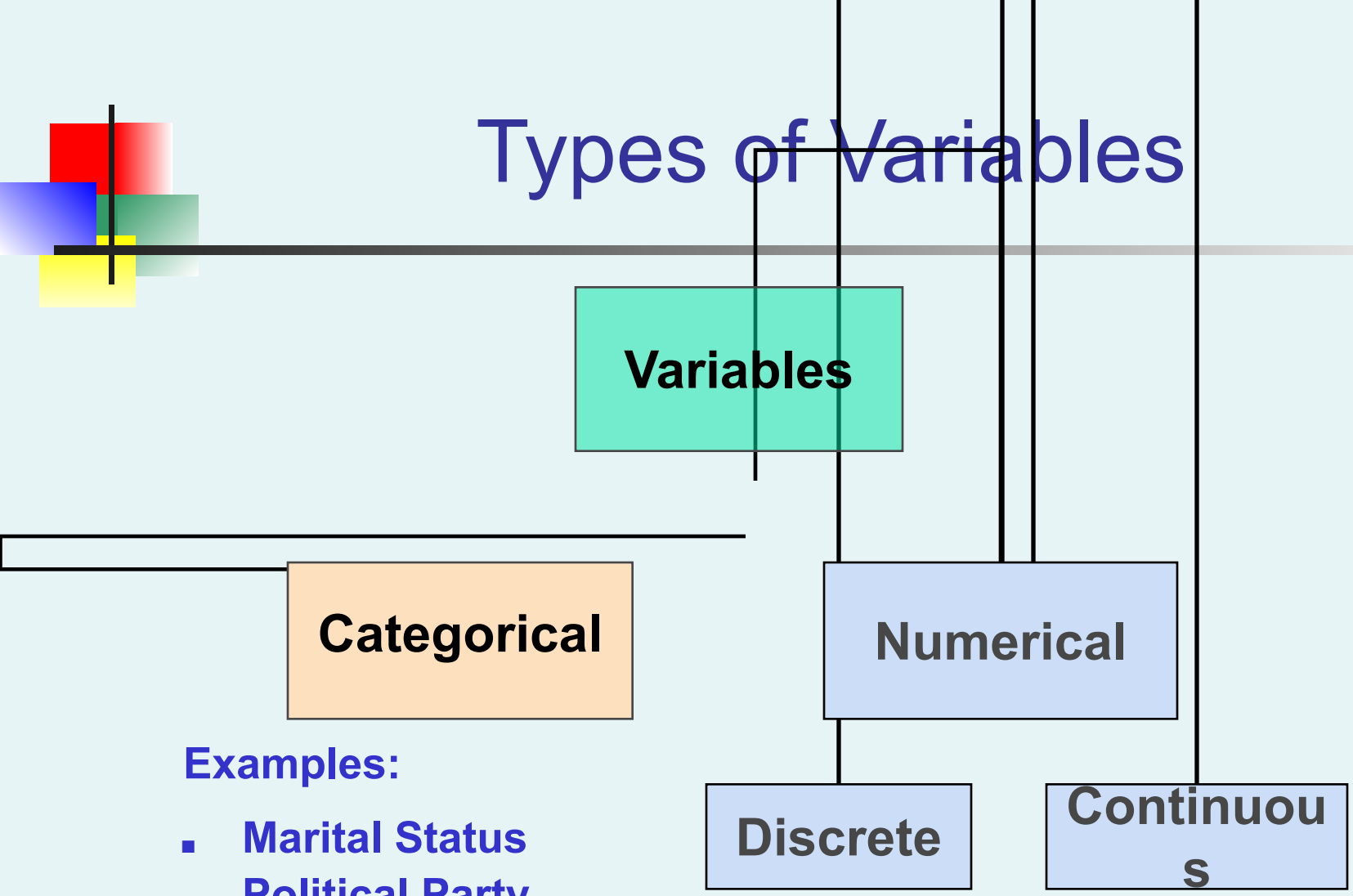
Universally accepted meanings that are clear to all associated with an analysis

Types of Variables

- **Categorical** (***qualitative***) variables have values that can only be placed into categories, such as "yes" and "no."

- **Numerical** (***quantitative***) variables have values that represent quantities.
  - **Discrete** variables arise from a ***counting process***
  - **Continuous** variables arise from a ***measuring process***

Types of Variables



Examples:

- Marital Status
- Political Party
- Eye Color

(Defined categories)

Examples:

- Number of Children
- Defects per hour

(Counted items)

Examples:

- Weight
- Voltage

(Measured characteristics)

Basic Vocabulary of Statistics (Con't)

POPULATION

All the items or individuals about which you want to draw a conclusion. The population is the "large group."

SAMPLE

The portion of a population selected for analysis. The sample is the "small group."

PARAMETER

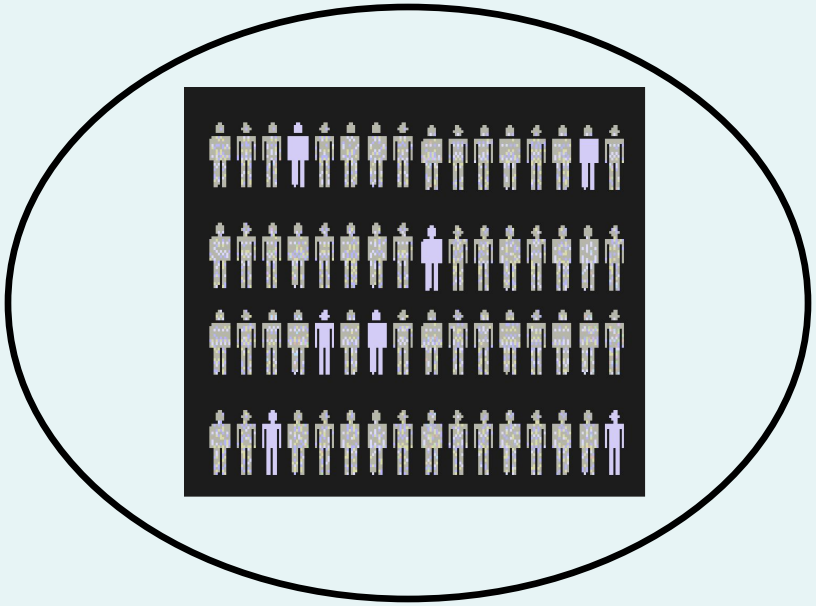
A numerical measure that describes a characteristic of a population.

STATISTIC

A numerical measure that describes a characteristic of a sample.

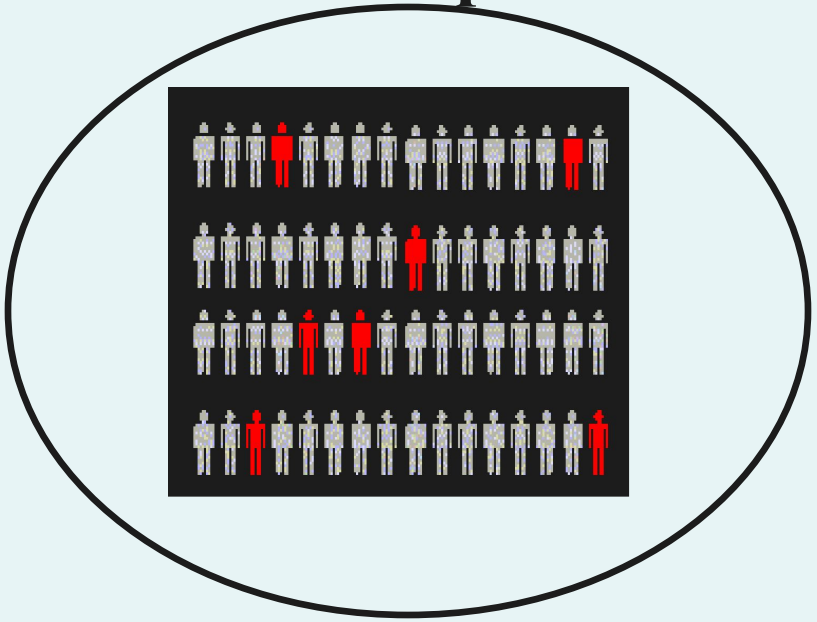
Population vs. Sample

Population



Measures used to describe the population are called **parameters**

Sample



Measures used to describe the sample are called **statistics**

This Book Is Organized To Show The Four Uses Of Statistics

- To summarize business data (Chapters 2 & 3)
- To draw conclusions from business data (Chapters 4 – 11)
- To make reliable forecasts about business activities (Chapters 12 & 13)
- To improve business processes (Chapter 14)

What are data?

A. A bunch of numbers

B. Values along with context

C. Words only

Variables that are numbers are always quantitative.

A. True

B. False

Individuals who answer a survey are called:

A. Subjects

B. Participants

C. Respondents

D. Units

The SPCA collects data about the dogs they house. Which is categorical?

A. Breed

B. Age

C. Weight

D. Veterinary costs

School administrators collect data on the students attending the school. Which of the following is quantitative?

A. Class (freshman, sophomore, etc.)

B. Grade point average

C. Whether the student is in AP class

D. Whether the student has taken the SAT

We collect these data from 50 students. Which variable is categorical?

A. Eye color

B. Head circumference

C. Hours of homework last week

D. Number of TV sets in at home

The W's (Who, What, When, Where, Why) provide _____ for data values.

A. Cases

B. Records

C. Context

D. Subjects

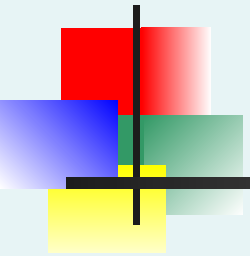
Chapter Summary

In this chapter we have:

- Described what statistics is
- Discussed why & how statistics is fundamental to business
- Defined the basic concepts and vocabulary of statistics

Exercise

- 1. The process of using sample statistics to draw conclusions about true population parameters is called
  - A. statistical inference.
  - B. the scientific method.
  - C. sampling.
  - D. descriptive statistics.



- 2. Those methods involving the collection, presentation, and characterization of a set of data in order to properly describe the various features of that set of data are called
  - A. statistical inference.
  - B. the scientific method.
  - C. sampling.
  - D. descriptive statistics.

- 3. The collection and summarization of the socioeconomic and physical characteristics of the employees of a particular firm is an example of
  - A. inferential statistics.
  - B. descriptive statistics.
  - C. a parameter.
  - D. a statistic.

- 4. The estimation of the population average family expenditure on food based on the sample average expenditure of 1,000 families is an example of
  - A. inferential statistics.
  - B. descriptive statistics.
  - C. a parameter.
  - D. a statistic.

- 5. The universe or "totality of items or things" under consideration is called
  - A. a sample.
  - B. a population.
  - C. a parameter.
  - D. a statistic.

- 6. The portion of the universe that has been selected for analysis is called
  - A. a sample.
  - B. a frame.
  - C. a parameter.
  - D. a statistic.

- 7. A summary measure that is computed to describe a characteristic from only a sample of the population is called
  - a parameter.
  - a census.
  - a statistic.
  - the scientific method.

- 8. A summary measure that is computed to describe a characteristic of an entire population is called
  - A. a parameter.
  - B. a census.
  - C. a statistic.
  - D. the scientific method.

- 9. Which of the following is most likely a population as opposed to a sample?
  - A. respondents to a newspaper survey.
  - B. the first 5 students completing an assignment.
  - C. every third person to arrive at the bank.
  - D. registered voters in a county.

- 10. Which of the following is most likely a parameter as opposed to a statistic?
  - A. The average score of the first five students completing an assignment.
  - B. The proportion of females registered to vote in a county.
  - C. The average height of people randomly selected from a database.
  - D. The proportion of trucks stopped yesterday that were cited for bad brakes.

- 11. Which of the following is not an element of descriptive statistical problems?
  - A. An inference made about the population based on the sample.
  - B. The population or sample of interest.
  - C. Tables, graphs, or numerical summary tools.
  - D. Identification of patterns in the data.

12. A study is under way in Yosemite National Forest to determine the adult height of American pine trees. Specifically, the study is attempting to determine what factors aid a tree in reaching heights greater than 60 feet tall. It is estimated that the forest contains 25,000 adult American pines. The study involves collecting heights from 250 randomly selected adult American pine trees and analyzing the results. Identify the population from which the study was sampled.

A. The 250 randomly selected adult American pine trees
B. The 25,000 adult American pine trees in the forest.
C. All the adult American pine trees taller than 60 feet.
D. All American pine trees, of any age, in the forest.

- 13. A study is under way in Yosemite National Forest… Identify the variable of interest in the study.
  - A. The age of an American pine tree in Yosemite National Forest.
  - B. The height of an American pine tree in Yosemite National Forest.
  - C. The number of American pine trees in Yosemite National Forest.
  - D. The species of trees in Yosemite National Forest.

- 14. Identify the sample in the study.
  - A. The 250 randomly selected adult American pine trees.
  - B. The 25,000 adult American pine trees in the forest.
  - C. All the adult American pine trees taller than 60 feet.
  - D. All American pine trees, of any age, in the forest.