1.1 Introduction to the Practice of Statistics MATH 241 THOMPSON

1) Define statistics.

Choose the correct answer below.

A. Statistics is the science of collecting, organizing, summarizing, and analyzing information to draw a conclusion and answer questions. In addition, statistics is about providing a measure of confidence in any conclusions.

2) A(n) individual is a person or object that is a member of the population being studied.

3) Descriptive statistics consists of organizing and summarizing information collected, while inferential statistics uses methods that generalize results obtained from a sample to the population and measure the reliability of the results.

4) A(n) statistic is a numerical summary of a sample.

A(n) parameter is a numerical summary of a population.

5) Variables are the characteristics of the individuals of the population being studied.

6) Determine whether the underlined value is a parameter or a statistic.

In a national survey on substance abuse, 66.4% of respondents who were full-time college students aged 18 to 22 reported using alcohol within the past month.

Is the value a parameter or a statistic?

A. The value is a statistic because the respondents who were full-time college students aged 18 to 22 are a sample.

7) Determine whether the underlined numerical value is a parameter or a statistic. Explain your reasoning.

The average annual salary of 50 of a company's 800 employees is $54,000.

H. Statistic, because the data set of salaries of 50 employees is a sample.

8) Determine whether the underlined value is a parameter or a statistic.

Following the election, 18% of the governors of all 50 areas of a country were female.

Is the value a parameter or a statistic?

D. The value is a parameter because the governors of all 50 area of a country are a population.

MORE PARAMETER STATISTIC EXAMPLES

Determine whether the given value is a statistic or a parameter.

A sample of professors is selected and it is found that 55% own a computer.

Statistic because the value is a numerical measurement describing a characteristic of a sample.

Determine whether the underlined numerical value is a parameter or a statistic. Explain your reasoning.

A certain zoo found that 8% of its 843 animals were nocturnal.

F. Parameter, because the data set of all 843 animals in a zoo is a population.

Determine whether the underlined numerical value is a parameter or a statistic. Explain your reasonin

The average annual salary of 50 of a company's 800 employees is $54,000.

F. Statistic, because the data set of salaries of 50 employees is a sample.

Determine whether the underlined numerical value is a parameter or a statistic. Explain your reasoning.

For a certain movie, 72 of the 112 members of the audience were females.

D. Parameter, because the data set of all 112 audience members is a population.

Determine whether the underlined value is a parameter or a statistic.

In a survey of 1,011 people age 50 or older, 73% agreed with the statement "I believe in life after death."

C. The value is a statistic because the 1,011 people age 50 or older are a sample.

9) Determine whether the variable is qualitative or quantitative.

Driver's license class

Is the variable qualitative or quantitative?

A. The variable is quantitative because it is an attribute characteristic.

B. The variable is qualitative because it is an attribute characteristic.

10) Determine whether the variable is qualitative or quantitative.

Favorite rock group

Is the variable qualitative or quantitative?

A. The variable is qualitative because it is an attribute characteristic.

11) Determine whether the variable is qualitative or quantitative.

Breed of cat

Is the variable qualitative or quantitative?

A. The variable is quantitative because it is a numerical measure.

B. The variable is qualitative because it is an attribute characteristic.

ANOTHER EXAMPLE OF QUALITATIVE OR QUANTATIVE

Determine whether the variable is qualitative or quantitative.

Number of words in a speech

Is the variable qualitative or quantitative?

A. The variable is quantitative because it is an attribute classification.

B. The variable is quantitative because it is a numerical measure.

12) Determine whether the quantitative variable is discrete or continuous.

Volume of a sound

Measurements, not counting numbers

D. The variable is continuous because it is not countable.

13) Determine whether the quantitative variable is discrete or continuous.

Amount of fabric needed for a dress

Measurements, not counting numbers

B. The variable is continuous because it is not countable.

14) Determine whether the quantitative variable is discrete or continuous.

Length of time to finish a crossword puzzle

Measurements, not counting numbers

B. The variable is continuous because it is not countable.

15) Determine whether the quantitative variable is discrete or continuous.

Passes made by a defenseman in a hockey game

Can be counted

B. The variable is discrete because it is countable.

MORE EXAMPLES OF DISCTRETE OR CONTINUOUS

Determine whether the quantitative variable is discrete or continuous.

Volume of gravel in a pile

Is the variable discrete or continuous?

A. The variable is continuous because it is not countable.

Determine whether the quantitative variable is discrete or continuous.

Number of beats in a song

Is the variable discrete or continuous?

A. The variable is discrete because it is countable.

Determine whether the quantitative variable is discrete or continuous.

Number of words in a song

Is the variable discrete or continuous?

- A. The variable is discrete because it is not countable.
- B. The variable is discrete because it is countable. ✔

Determine whether the quantitative variable is discrete or continuous.

Temperature on a randomly selected day in your home town

Is the variable discrete or continuous?

because no finite boundary

- A. The variable is discrete because it is countable.
- B. The variable is continuous because it is countable.
- C. The variable is continuous because it is not countable. ✔

Determine whether the quantitative variable is discrete or continuous.

Length of a piece of string

Because of no ending point

Is the variable discrete or continuous?

- A. The variable is discrete because it is countable.
- B. The variable is discrete because it is not countable.
- C. The variable is continuous because it is countable.
- D. The variable is continuous because it is not countable. ✔

Determine whether the quantitative variable is discrete or continuous.

Weight carried by a soldier in combat

Because you don't know what he has to carry

Is the variable discrete or continuous?

- A. The variable is continuous because it is not countable. ✔

Nominal – gender is example because it is male or female

Interval – temperature because there is a difference in measures and zero counts

Ratio – number of days past a student studied because it can be written as a ratio and zero is and absence

Ordinal – letter grade in a class because it is categorized in order high to low or low to high

16) Determine the level of measurement of the variable.

Ranks of scores in a tournament

Like letter grades, categorized with high to low

Choose the correct level of measurement.

- [x] Ordinal

17) Determine the level of measurement of the variable.

Time of day measured in military time: 1700, 1800, 1900, 2000, and 2100

Choose the correct answer below.

Like temperature

- [x] Interval

18) Determine the level of measurement of the variable below.

Assessed value of a house

Can be written as a ratio and zero is absence

- [x] D. Ratio

MORE EXAMPLES: NOMINAL, INTERVAL, RATIO, ORDINAL

Determine the level of measurement of the variable.

States in a region

Choose the correct level of measurement.

- [ ] Interval
- [ ] Ordinal
- [ ] Ratio
- [x] Nominal

Determine the level of measurement of the variable.

Monthly temperatures: 62° F, 66° F, 70° F, 74° F, and 78° F

Choose the correct answer below.

- [ ] Ratio
- [x] Interval
- [ ] Ordinal
- [ ] Nominal

Determine the level of measurement of the variable.

Weight of a child: 50 lbs, 56 lbs, 62 lbs, 68 lbs, and 74 lbs

Choose the correct answer below.

- [ ] Interval
- [ ] Nominal
- [x] Ratio
- [ ] Ordinal

Determine the level of measurement of the variable.

Years of elections: 1988, 1992, 1996, 2000, and 2004

Choose the correct answer below.

- [ ] Nominal
- [x] Interval

Determine the level of measurement of the variable below.

Assessed value of a house

Choose the correct answer below.

- [ ] A. Nominal
- [ ] B. Interval
- [ ] C. Ordinal
- [x] D. Ratio

Determine the level of measurement of the variable below.

Eye color

Choose the correct answer below.

- [ ] A. Ordinal
- [x] B. Nominal

19) A polling organization contacts 2636 female university graduates who have a white collar job and asks whether or not they had received a raise at work during the past 6 months.

What is the population in the study?

A. Female university graduates who have a white collar job.

What is the sample in the study?

A. The 2636 female university graduates who have a white collar job.

20) A quality-control manager randomly selects 70 bottles of tomato sauce that were filled on October 13 to assess the calibration of the filling machine.

What is the population in the study?

A. All bottles of tomato sauce produced in the plant on October 13.

What is the sample in the study?

A. The 70 bottles of tomato sauce selected in the plant on October 13.

21) The data on the right relate to characteristics of high-definition televisions A through E.

Identify the individuals, variables, and data corresponding to the variables. Determine whether each variable is qualitative, continuous, or discrete.

Setup	Size (in)	Screen Type	Number of Channels Available
A	42	Plasma	298
B	54	Plasma	115
C	60	Projection	424
D	56	Plasma	269
E	52	Plasma	290

What are the individuals being studied?

A. Television setups that include more than 100 channels.

B. The high-definition television setups A through E.

B. Size (42, 54, 60, 56, 52), screen type (Plasma, Plasma, Projection, Plasma, Plasma), and number of channels available (298, 115, 424, 269, 290)

Determine whether each variable is qualitative, continuous, or discrete.

Size is a continuous variable.

Screen type is a qualitative variable.

Number of channels available is a discrete variable.

22) A study conducted by researchers was designed "to determine if application of duct tape is as effective as cryotherapy in the treatment of common warts." The researchers randomly divided 55 patients into two groups. The 28 patients in group 1 had their warts treated by applying duct tape. The 27 patients in group 2 had their warts treated by cryotherapy. Once the treatments were complete, it was determined that 61% of the patients in group 1 and 81% of the patients in group 2 had complete resolution of their warts. The researchers concluded that cryotherapy is significantly more effective in treating warts than duct tape. Complete parts (a) through (d) below.

(a) What is the research objective?

D. To determine if duct tape is as effective as cryotherapy in the treatment of warts

(b) What is the population being studied? What is the sample?

What is the population being studied?

D. All people who have warts

What is the sample?

A. The 55 patients with warts

(c) What are the descriptive statistics?

D. 61% of patients in group 1 and 81% of patients in group 2 had resolution of their warts.

Notice group 2(cryotherapy) has higher percentage

(d) What is the conclusion of the study?

D. Cryotherapy is significantly more effective than duct tape in treating warts.

ANOTHER #22

A study conducted by researchers was designed "to determine if application of duct tape is as effective as cryotherapy in the treatment of common warts." The researchers randomly divided 70 patients into two groups. The 35 patients in group 1 had their warts treated by applying duct tape. The 35 patients in group 2 had their warts treated by cryotherapy. Once the treatments were complete, it was determined that 60% of the patients in group 1 and 40% of the patients in group 2 had complete resolution of their warts. The researchers concluded that duct tape is significantly more effective in treating warts than cryotherapy.

(a) Identify the research objective. Which of the following is correct?

D. To determine if duct tape is as effective as cryotherapy in treating warts.

(b) Identify the sample. Which of the following is correct?

D. The 70 patients with warts.

(c) List the descriptive statistics. Which of the following is correct?

C. 60% of patients in group 1 and 40% of patients in group 2 with complete resolution.

(d) State the conclusion of the study. Which of the following is correct?

Group 1 (duck tape) has higher percentage

D. Duct tape is significantly more effective than cryotherapy in treating warts.

EXAMPLES OF NOMINAL, ORDINAL, INTERVAL AND RATIO

Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate.
Voltage measurements of batteries: 1.5V, 3V, 4.5V, 6V, and 7.5V

a) nominal
b) ordinal
c) interval
d) ratio

Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate. Livability rankings for cities

a) nominal
b) ordinal
c) interval
d) ratio

Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate. Body temperature in degrees Fahrenheit

a) nominal
b) ordinal
c) interval
d) ratio

Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate. College ranking

a) nominal
b) ordinal
c) interval
d) ratio

Determine which of the four levels of measurement (nominal, ordinal, interval, ratio) is most appropriate. Car models

a) nominal
b) ordinal
c) interval