Exam

Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

1)

One of the reasons that the Monitoring the Future (MTF) project was started was "to study changes in the beliefs, attitudes, and behavior of young people in the United States." Data are collected from 8th, 10th, and 12th graders each year. To get a representative nationwide sample, surveys are given to a randomly selected group of students. In Spring 2016, students were asked about alcohol, illegal drug, and cigarette use. Describe the W's, if the information is given. If the information is not given, state that it is not specified.

• Who:

• What:

• When:

• Where:

• How:

• Why:

2)

Consider the following part of a data set:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Age(years) | Sex | Only child? | Height(inches) | Weight(pounds) | CreditHours | GPA | Major |
| 21 | Female | Yes | 67.00 | 140.0 | 16 | 3.60 | animal science |
| 20 | Female | No | 62.00 | 130.0 | 18 | 3.86 | biology |
| 28 | Female | No | 64.00 | 188.0 | 21 | 3.25 | psychology |
| 21 | Male | No | 65.00 | 140.0 | 15 | 2.95 | psychology |
| 24 | Female | No | 67.00 | 130.0 | 20 | 3.00 | anthropology |
| 22 | Male | Yes | 68.00 | 135.0 | 15 | 2.94 | journalism |

List the variables in the data set. Indicate whether each variable is treated as categorical or quantitative in this data set. If the variable is quantitative, state the units.

In November 2003 *Discover* published an article on the colonies of ants. They reported some basic information about many species of ants and the results of some discoveries found by myrmecologist Walter Tschinkel of the University of Florida. Information included the scientific name of the ant species, the geographic location, the depth of the nest (in feet), the number of chambers in the nest, and the number of ants in the colony. The article documented how new ant colonies begin, the ant-nest design, and how nests differ in shape, number, size of chambers, and how they are connected, depending on the species. It reported that nest designs include vertical, horizontal, or inclined tunnels for movement and transport of food and ants.

3)

Describe the W's, if the information is given:

• Who:

• What:

• When:

• Where:

• How:

• Why:

4)

List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.

In May 2017, Wirecutter published an article entitled "The Best True Wireless Headphones So Far" (http://thewirecutter.com/reviews/best-true-wireless-headphones/). They tested 11 "of the most promising true wireless in-ear headphones." Among other things, the article told the brand of each pair of headphones, its price, battery life, audio quality, ease of setup, and other characteristics. The article provides a number of recommendations including best for the money, best for the gym, best for Apple, and best for Android. The author, Lauren Dragan, describes herself as a voice actor with an audio production degree who has spent hundreds of hours testing headphones for Wirecutter.

5)

Describe the W's, if the information is given:

• Who:

• What:

• When:

• Where:

• How:

• Why:

6)

List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

7)

In the fall of 2007, the *Pew Internet & Life Project* conducted telephone interviews with a sample of American adults aged 18 and older about online shopping. American adults aged 18 and older constitute the \_\_\_\_\_\_\_\_ of the study.

7)

\_\_\_\_\_\_\_

A)

Where

B)

What

C)

Who

D)

How

E)

When

8)

A few of the variables for which data were collected in the *Pew Internet & Life Project* study about online shopping include age, gender, income, and number of hours spent shopping online per month. Which of the variables is categorical?

8)

\_\_\_\_\_\_\_

A)

Income

B)

Number of hours spent shopping online

C)

Age

D)

Gender

E)

None

9)

The *Pew Internet & Life Project* study about online shopping asked respondents to indicate their education level on the following scale: *Less than High School, High School, Some College, College +.* Which of the following statements is (are) TRUE?

9)

\_\_\_\_\_\_\_

A)

Education level is a categorical variable.

B)

Education level is nominal scaled.

C)

Education level is ordinal scaled.

D)

Both A and B

E)

Both A and C

10)

*Consumer Reports Health* routinely compares drugs in terms of effectiveness and safety. In summer 2008 they reviewed drugs used to treat arthritis. Among the information reported was convenience of use (how many pills required each day) and possible side effects (e.g., dizziness, stomach upset). Convenience of use and possible side effects constitute the \_\_\_\_\_\_\_\_ of the study.

10)

\_\_\_\_\_\_

A)

What

B)

Where

C)

Who

D)

How

E)

When

11)

What is the "Who" in a *Consumer Reports Health* study on the effectiveness and safety of drugs used to treat arthritis?

11)

\_\_\_\_\_\_

A)

the United States

B)

summer 2008

C)

testing on drugs

D)

convenience of use and possible side effects

E)

drugs to treat arthritis currently on the market

12)

A *Consumer Reports Health* study on the effectiveness and safety of arthritis drugs collected data on possible side effects. This is what kind of variable?

12)

\_\_\_\_\_\_

A)

Quantitative

B)

Nominal

C)

Categorical

D)

Both A and C

E)

Both B and C

13)

A *Consumer Reports Health* study on arthritis drugs takes into consideration cost. Cost

13)

\_\_\_\_\_\_

A)

is an ordinal variable.

B)

is a nominal variable.

C)

is a quantitative variable.

D)

is a categorical variable.

E)

is an irrelevant variable.

14)

The Human Resources Department of a large corporation maintains records on its employees. Data are maintained of the following variables: *Age, Employment Category, Education, Whether or not the employee participates in a wellness program, and Paycheck benefit deductions.* Which of these variables are categorical?

14)

\_\_\_\_\_\_

A)

*Education, Whether or not the employee participates in a wellness program*, and *Paycheck benefit deductions*

B)

*Employment Category, Education*, and *Whether or not the employee participates in a wellness program*

C)

*Age, Employment Category*, and *Education*

D)

All of the variables

E)

None of the variables

15)

A *Consumer Reports* study on tipping takes into consideration median amount of tipping for service providers. Tipping

15)

\_\_\_\_\_\_

A)

is a categorical variable.

B)

is an irrelevant variable.

C)

is a quantitative variable.

D)

is an ordinal variable.

E)

is a nominal variable.

16)

The Human Resources Department of a large corporation maintains records on its employees. Data are maintained of the following variables: *Age, Employment Category, Education,* and *Whether or not the employee has an advanced degree.* Which of these variables are categorical?

16)

\_\_\_\_\_\_

A)

*Age, Employment Category*, and *Education*

B)

*Education and Whether or not the employee has an advanced degree*

C)

*Employment Category and Education*

D)

All of the variables

E)

None of the variables

17)

A university is interested in gauging student satisfaction in its online MBA program. A survey is designed and administered via the Internet to a sample of students currently active in the program. Which of the following would best describe the cases?

17)

\_\_\_\_\_\_

A)

Subjects

B)

Variables

C)

Respondents

D)

Participants

E)

Experimental Units

18)

In a survey undertaken by a university to gauge student satisfaction in its online MBA program, one question asked students to indicate their employment status (unemployed, employed part-time, employed full-time). Which of the following is TRUE?

18)

\_\_\_\_\_\_

A)

This is an identifier variable.

B)

This variable is categorical.

C)

This variable is quantitative.

D)

Both A and C.

E)

Both B and C.

19)

In a survey undertaken by a university to gauge student satisfaction in its online MBA program, one question asked students to indicate the number of credits they had transferred into the program. Which of the following is TRUE?

19)

\_\_\_\_\_\_

A)

This variable is nominal.

B)

This is an identifier variable.

C)

This variable is categorical.

D)

This variable is transactional.

E)

This variable is quantitative.

20)

Researchers in e-commerce design an experiment to determine what factors are most important to online consumers when completing a transaction via the Internet. Individuals perform tasks on a set of Web sites and record their impressions about various attributes. Which of the following would best describe the cases?

20)

\_\_\_\_\_\_

A)

Experimental Units

B)

Respondents

C)

Variables

D)

Participants

E)

Identifiers

21)

A popular travel magazine regularly reviews hotels worldwide. In a recent issue, it focused on hotels in Hawaii. Among the variables for which it provided data was whether or not the hotel included a spa. This is best described as a

21)

\_\_\_\_\_\_

A)

ordinal variable.

B)

identifier variable.

C)

nominal variable.

D)

categorical variable.

E)

quantitative variable.

22)

A popular travel magazine regularly reviews hotels worldwide. In a recent issue, it focused on hotels in Hawaii. Among the variables for which it provided data was the price range for rooms with an ocean view. Which of the following statements is TRUE?

22)

\_\_\_\_\_\_

A)

This variable is qualitative and ordinal.

B)

This variable is quantitative and the units are $.

C)

This variable is quantitative and the units are number of rooms.

D)

This variable is qualitative and nominal.

E)

This variable is quantitative and has no units.

23)

A mid-priced chain of hotels, *Hometown Suites*, strives to make its guests "feel at home" by providing amenities such as microwaves in every room. Comment cards are used to get feedback on the importance of such amenities by asking guests to rate them using the scale: \_\_\_\_\_\_\_\_ Essential \_\_\_\_\_\_\_\_ Important \_\_\_\_\_\_\_\_ Not Important. These data are

23)

\_\_\_\_\_\_

A)

ordinal.

B)

nominal.

C)

qualitative.

D)

both A and B.

E)

both A and C.

24)

*Businesses* are interested in the work experience of recent graduates from a local business school. Whether or not the graduates have work experience constitutes the \_\_\_\_\_\_\_\_ of the study.

24)

\_\_\_\_\_\_

A)

What

B)

How

C)

When

D)

Who

E)

Where

25)

What is the "What" in a *Consumer Reports Tipping* study on the level of tipping during the current holiday season compared to the last holiday season?

25)

\_\_\_\_\_\_

A)

whether or not tipped

B)

the United States

C)

amount of tip compared to last year

D)

the type of tip

26)

A *Consumer Reports* survey on the level of tipping for service providers. This is what kind of variable?

26)

\_\_\_\_\_\_

A)

Nominal

B)

Quantitative

C)

Ordinal

D)

Both A and C

E)

Both B and C

**ESSAY. Write your answer in the space provided or on a separate sheet of paper.**

27)

Students in a statistics course were asked to answer a variety of questions. One question asked for students to pick a favorite Superpower. Results are listed to the right.

a. Create a visual display for these data.

|  |  |
| --- | --- |
| Superpower | Num of Students |
| Fly | 19 |
| Freeze Time | 11 |
| Invisibility | 7 |
| Super strength | 4 |
| Telepathy | 12 |

b. Describe the distribution of the students' choices.

28)

Which of the following variables would be appropriate to graph using a pie or bar graph?

a. Annual income for 20 employees Yes or No

b. The favorite baseball team of 30 students Yes or No

c. The number of pages in 15 textbooks Yes or No

d. The country of origin of 25 immigrants Yes or No

29)

Describe why the area principle is important in making a bar graph. It might be fun to ask an artist to liven up a bar graph by turning the bars into images. But include in your explanation why this might be risky.

30)

A survey conducted in a college intro stats class asked students about the number of credit hours they were taking that quarter. The number of credit hours for a random sample of 16 students is given in the table.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 10 | 10 | 12 | 14 | 15 | 15 | 15 | 15 |
| 17 | 17 | 19 | 20 | 20 | 20 | 20 | 22 |

a. Sketch a histogram of these data.

b. Find the mean and standard deviation for the number of credit hours.

c. Find the median and IQR for the number of credit hours.

d. Is it more appropriate to use the mean and standard deviation or the median and IQR to summarize theses data? Explain.

31)

Suppose that the student taking 22 credit hours in the data set in the previous question was actually taking 28 credit hours instead of 22 (so we would replace the 22 in the data set with 28). Indicate whether changing the number of credit hours for that student would make each of the following summary statistics increase, decrease, or stay about the same:

a. mean

b. median

c. range

d. IQR

e. standard deviation

32)

The students in a biology class kept a record of the height (in centimeters) of plants for a class experiment.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 49 | 67 | 38 | 55 | 62 |
| 54 | 36 | 41 | 56 | 43 |
| 48 | 75 | 44 | 60 | 48 |
| 52 | 48 | 53 | 59 | 32 |

a. Sketch a histogram for these data.

b. Find the mean and standard deviation of the plant heights.

c. Is it appropriate to use the mean and standard deviation to summarize these data? Explain.

d. Describe the distribution of plant heights.

33)

All students in a physical education class completed a basketball free-throw shooting event and the highest number of shots made was 32. The next day a student who had just transferred into the school completed the event, making 35 shots. Indicate whether adding the new student's score to the rest of the data made each of these summary statistics increase, decrease, or stay about the same:

a. mean

b. median

c. range

d. IQR

e. standard deviation

34)

A brake and muffler shop reported the repair bills, in dollars, for their customers yesterday.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 88 | 283 | 312 | 290 | 172 |
| 154 | 400 | 381 | 346 | 181 |
| 203 | 118 | 143 | 252 | 227 |
| 56 | 192 | 292 | 213 | 422 |

a. Sketch a histogram for these data.

b. Find the mean and standard deviation of the repair costs.

c. Is it appropriate to use the mean and standard deviation to summarize these data? Explain.

d. Describe the distribution of repair costs.

35)

In a survey of 1,500 millennials (ages 18-34), *Business Insider* asked which services were used to consume video content. Use the data on the right to construct an appropriate display **and** describe your graph.

|  |  |
| --- | --- |
| Service | Percent |
| YouTube | 81% |
| Netflix | 79% |
| Hulu | 37% |
| Amazon Prime | 34% |
| HBO | 21% |
| Crackle | 12% |
| None | 3% |
| Other | 2% |

**MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**

36)

A automobile marketing firm conducts a study to see what types of cars people owned before buying an American car. The results are shown below.

|  |  |
| --- | --- |
| **Previous Ownership** | **Frequency** |
| American | 760 |
| Japanese | 375 |
| Korean | 72 |
| German | 37 |
| Other | 24 |
| **Total** | **1268** |

The relative frequency of those who owned Japanese cars previously who now bought American cars is

36)

\_\_\_\_\_\_

A)

29.6%

B)

2.9%

C)

59.9 %

D)

14.9%

E)

5.7%

37)

A restaurant uses comment cards to get feedback from its customers about newly added items to the menu. It recently introduced homemade organic veggie burgers. Customers who tried the new burger were asked if they would order it again. The data are summarized in the table below. What percentage of customers would definitely order the veggie burger again?