# PAD 316 Review questions

1.   Jason is buying a new computer. He is comparing various models using many different variables. These variables play an important role in making the decision about which computer he will buy. Identify each of the following variables as categorical or quantitative.
A)   Does the computer come with a CD/DVD writer?
B)   What is the hard drive size of the computer?
C)   Is the computer a laptop or a desktop model?
D)   How much does the computer cost?

In a statistics class with 136 students, the professor records how much money each student has in their possession during the first class of the semester. The histogram shown below represents the data he collected:
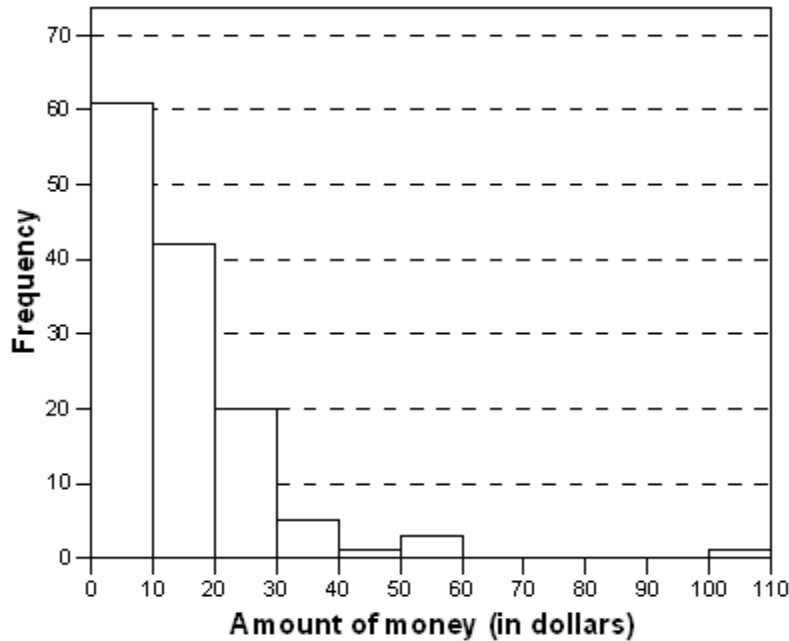
2.   What is approximately the percentage of students with under $10.00 in their possession?
A)   35%   C)   44%
B)   40%   D)   50%

3. Which of the following description(s) is/are correct regarding the shape of the histogram (more than one answers)?

A) Skewed right   D) An outlier is present.
B) Skewed left   E) Unimodal
C) Symmetric   F) Bimodal

The Insurance Institute for Highway Safety publishes data on the total damage suffered by compact automobiles in a series of controlled, low-speed collisions. The cost for a sample of 9 cars, in hundreds of dollars, is provided below:

10   6   8   10   4   3.5   7.5   8   9

4. What is the median cost of the total damage suffered for this sample of cars?

A) $400   C) $800
B) $730   D) $1000

5. What is the first quartile for the above data?

A) $350   C) $600
B) $500   D) $800

6. What is the interquartile range of the above data?

A) $300   C) $400
B) $350   D) $450

7. What is the mean of the total damage suffered for this sample of cars?

A) $239
B) $733
C) $800
D) $950

Malaria is a leading cause of infectious disease and death worldwide. It is also a popular example of a vector-borne disease that could be greatly affected by the influence of climate change. The scatterplot shows total precipitation (in mm) in select cities in West Africa on the x-axis and the percent of people tested positive for malaria in the select cities on the y-axis in 2000.
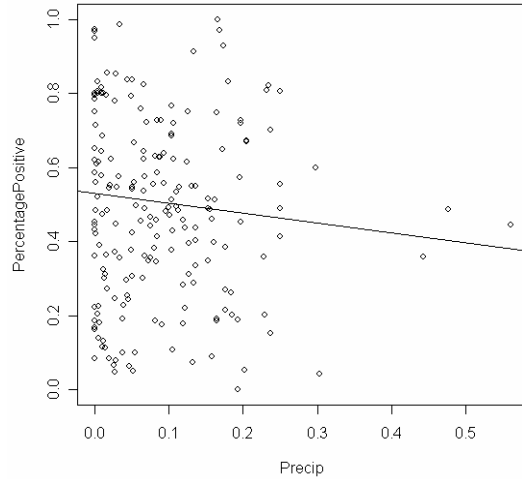
8.   There is a strong linear relationship between percentage of people tested positive
        for malaria and precipitation.
A)   True
B)   False

9.   Precipitation is the _____ variable.
A)   Independent
B)   Dependent
C)   Response
D)   Explanatory
E)   A and B
F)   A and D

10.   Percent tested positive for malaria is the _____ variable.
A)   Independent
B)   Dependent
C)   Response
D)   Explanatory
E)   B and C
F)   A and B

11.   The correlation between precipitation and percent tested positive for malaria is
        probably close to _____.
A)   1
B)   0
C)   Can't tell

12.   A study found a correlation of $r = -0.61$ between the gender of a worker and his or her income. Determine whether each of the following conclusions regarding this correlation coefficient is true or false.

A)   Women earn more than men on the average.
B)   Women earn less than men on the average.
C)   An arithmetic mistake was made. Correlation must be positive.
D)   This measurement makes no sense; r can only be measured between two quantitative variables.

13. Match the four graphs labeled A, B, C, and D, with the following four possible values of the correlation coefficient: –0.9, –0.7, 0.4, 0.95. Assume all four graphs are made on the same scale.
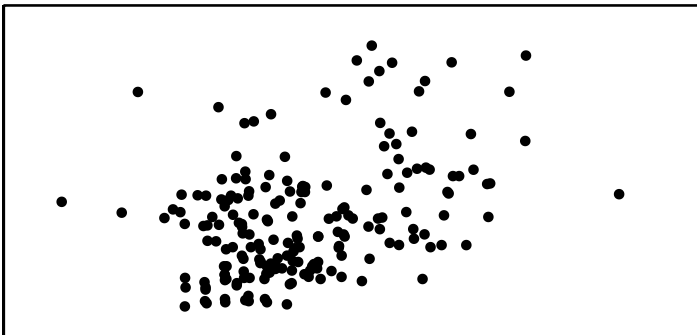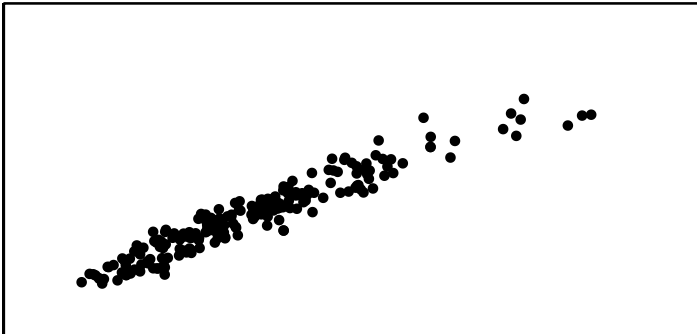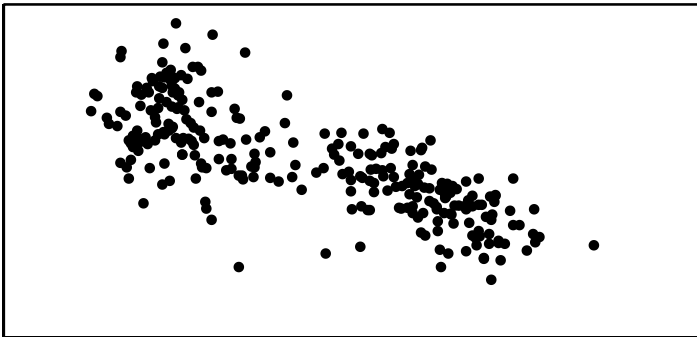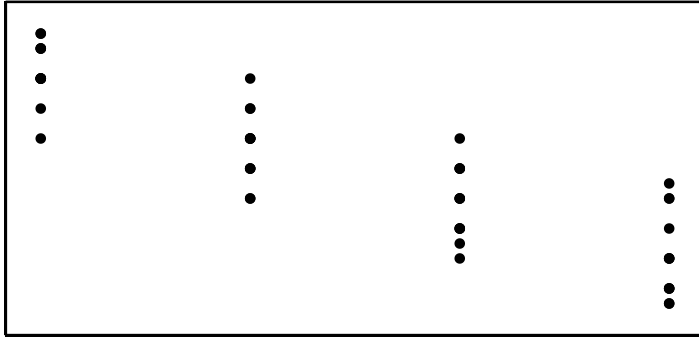
A student organization is trying to decide whether or not to offer more movies on campus. They want to determine whether this idea will appeal to members of both genders. A random sample of 1000 students was asked if they were in favor of more movies on campus. The results by gender are shown in the table below:

Gender	Opinion		
	In favor	No opinion	Opposed
Male	330	165	55
Female	225	180	45

14. What proportion of the sampled students is in favor of more movies on campus?
A) 0.33   C) 0.555
B) 0.5   D) 0.6

15. What proportion of the sampled females is in favor of more movies on campus?
A) 0.33   C) 0.555
B) 0.5   D) 0.6

16. To answer the original question regarding whether or not to offer more movies on campus, which distribution should the student organization study?
A) The joint distribution of gender and opinion.
B) The marginal distribution of gender.
C) The conditional distribution of gender given opinion.
D) The conditional distribution of opinion given gender.

17. A pie chart of the departments in the school/college from which the 1100 sampled students graduated is shown below:

Fine Arts
.2%

Engineering
25.5%

Agriculture
37.7%

Education
1.2%

Forestry
.2%

Architecture
.9%

Business Admin.
29.3%

Building/Constr.
5.0%

Based on the graph, (approximately) how many of the sampled students graduated with a degree in Building/Construction or Architecture?

   A) 55
   B) 59
   C) 65
   D) 99

18.   Fill in the blank. A study is conducted to determine if one can predict the yield of a crop based on the amount of yearly rainfall. The variable _____ is the response variable in this study.

19.   Which of the following statements is (are) FALSE?

   A) A scatterplot is a useful graphical tool for displaying the strength of the relationship between two quantitative variables.
   B) The only relationship that a scatterplot can usefully display is linear with no outliers.
   C) If above average values of two quantitative variables and below average values of the same two quantitative variables tend to occur together, the two variables are positively associated.
   D) An individual value that deviates from the overall pattern displayed on a scatterplot is called an outlier.
   E) A categorical variable can be added to a scatterplot by using a different color or symbol for each category.

20.   An outlier is _____.

   A) a point in a scatterplot that follows the same pattern as the other points
   B) a point in a scatterplot that does not follow the same pattern as the other points
   C) All of the above.
   D) None of the above.

21.   Positive linear relationships are represented by values of the correlation, r, that are____.

   A) greater than zero
   B) less than zero
   C) zero

22.   The correlation coefficient between two variables x and y is $r = 0.121$. What conclusion can we draw?

A) Because the correlation is so low, the relationship between x and y is not very strong, thus there is no use in studying this relationship.
B) Because the correlation is so low, we only know that the linear relationship between x and y is not very strong, but there may be a different relationship between the two variables. We need to first look at a scatterplot.
C) None of the above.

23.   As Swiss cheese matures, a variety of chemical processes take place. The taste of matured cheese is related to the concentration of several chemicals in the final product. In a study of cheese in a certain region of Switzerland, samples of cheese were analyzed for lactic acid concentration and were subjected to taste tests. The numerical taste scores were obtained by combining the scores from several tasters. A scatterplot of the observed data is shown below:
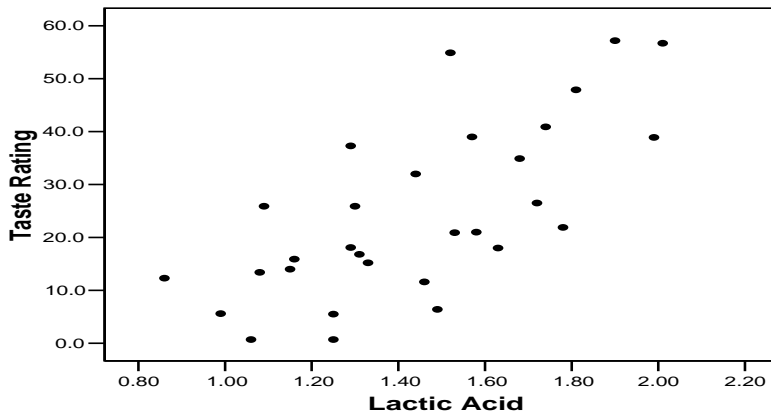
What is a plausible value for the correlation between lactic acid concentration and taste rating?

A) 0.999
B) 0.8
C) 0.2
D) –0.7

(For 24 and 25) Are avid readers more likely to wear glasses than those who read less frequently? Three-hundred men in Ohio were selected at random and characterized as to whether they wore glasses and whether the amount of reading they did was above average, average, or below average. The results are presented in the following table:

| | Glasses? | |
Amount of reading	Yes	No
Above average	47	26
Average	48	78
Below average	31	70

24. What is the proportion of men in the sample who wear glasses? (Hint: marginal distribution)

   A) 0.24
   B) 0.42
   C) 0.37
   D) 0.64

25. What proportion of men who wear glasses is above average reader? (Hint: conditional distribution)

   A) 0.24
   B) 0.42
   C) 0.37
   D) 0.64

26. A study is designed to determine whether grades in a statistics course could be improved by offering special review material. The 250 students enrolled in a large introductory statistics class are also enrolled in one of 20 lab sections. The 20 lab sections are randomly divided into 2 groups of 10 lab sections each. The students in the first set of 10 lab sections are given extra review material during the last 15 minutes of each weekly lab session. The students in the remaining 10 lab sections receive the regular lesson material, without the extra review material. The grades of the students who reviewed weekly were higher, on average, than the students who did not review every week. What type of study is this?

A)   An observational study.
B)   An experiment, but not a double-blind experiment.
C)   A double-blind experiment.
D)   A matched-pairs experiment.

27. A baseball enthusiast believes pitchers who strike out a lot of batters also walk a lot of batters. He reached this conclusion by going to the library and examining the records of all major league pitchers between 1990 and 1995. What type of study is his decision based on?
A) Anecdotal evidence.
B) An observational study based on available data.
C) An observational study based on a sample survey.
D) An experiment.

Use the following to answer questions 28 and 29:

A group of college students believes that herbal tea has remarkable restorative powers. To test its theory, the group makes weekly visits to a local nursing home, visiting with residents, talking with them, and serving them herbal tea. After several months, many of the residents are more cheerful and healthy.

28. What is the explanatory variable in this experiment?
A) The emotional state of the residents.
B) Herbal tea.
C) The fact that this is a local nursing home.
D) The college students.

29. What is the lurking variable in this experiment?
A) The emotional state of the residents.
B) Herbal tea.
C) The fact that this is a local nursing home.
D) Visits of the college students.

Use the following to answer questions 30–35:

To investigate whether or not sending text messages while driving impacts driving ability, we have 100 participants (50 men and 50 women) drive an obstacle course under one of the following conditions: 1) No texting while driving, 2) Sending five text messages while driving, or 3) Sending 10 text messages while driving. We measure the accuracy the subjects drove the obstacle course from a scale of 1 to 10 (1= poor and 10= excellent).

30. What is the response variable in this study?

31.   What type of study is this?
A)   Observation study
B)   Experiment
C)   Matched pairs

32.   What is the treatment in this study?

33.   This study includes which of the following:
A)   Blinding
B)   Control
C)   Lack of realism

34.   Why is a control necessary in this experiment?
A)   The control is used for the subjects who do not know how to send text messages.
B)   The control helps determine if men are better drivers than women.
C)   To help control for the lurking variables.

35.   Explain how you would randomize this study.

Use the following to answer questions 36 and 37:

A television station is interested in predicting whether or not voters in its listening area are in favor of federal funding for abortions. It asks its viewers to phone in and indicate whether they are in favor of or opposed to this. Of the 2241 viewers who phoned in, 1574 (70.24%) were opposed to federal funding for abortions.

36.   Fill in the blank. The number 70.24% is a _____.
A)   statistic   C)   sample
B)   parameter   D)   population

37.   What type of sampling method was used to collect the data?
A)   A simple random sample.
B)   A stratified random sample.
C)   A probability sample in which each person in the population has the same chance of being in the sample.
D)   Voluntary response.

38.   An opinion poll is to be given to a sample of 90 members of a local gym. The members
        are first divided into men and women, and then a simple random sample of 45 men and
        a separate simple random sample of 45 women are taken. What is this is an example of?
A)   A block design.
B)   A stratified random sample.
C)   A double-blind simple random sample.
D)   A randomized comparative experiment.

39.   Which of the following cannot give informed consent to participate in a study?
A)   Children
B)   Inmates
C)   Mentally ill patients
D)   All of the above.

40.   The number of Facebook friends students at a university have are Normally distributed
with a mean of 1,200 and a standard deviation of 200.
        What percent of students have at least 1000 Facebook friends?
A)   84.13%
B)   15.86%
C)   42.07%
D)   None of the above

41.   For the density curve displayed below, what is the mean?
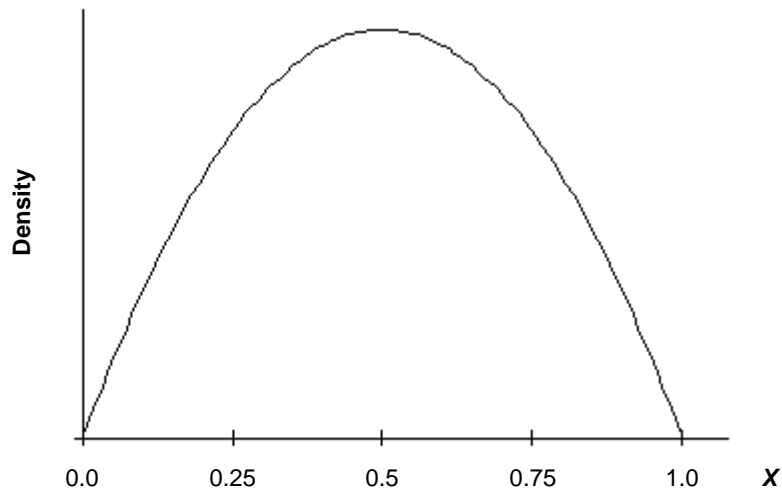
A)   0.25
B)   0.50
C)   0.71
D)   0.75

42.   Determine whether each of the following statements regarding a Normal density curve
       is true or false.
A)   It is symmetric.
B)   It has a peak centered above its mean.
C)   The quartiles lie 1 standard deviation below and above the mean.
D)   Approximately 68% of the units lie 1 standard deviation below and above the mean.

Use the following information to answer questions 43 and 44:

Many residents of suburban neighborhoods own more than one car but consider one of their cars
to be the main family vehicle. The age of these family vehicles can be modeled by a Normal
distribution with a mean of 2 years and a standard deviation of 6 months.

43.   What percentage of family vehicles is between 1 and 3 years old?
A)   Cannot be determined based on the information given.
B)   68%
C)   95%
D)   99.7%

44. What is the standardized value (z-score) for a family vehicle that is 3 years and 3 months old?
A) 0.22
B) 2.5
C) 2.6
D) 2.92

45. Items produced by a manufacturing process are supposed to weigh 90 grams. However, there is variability in the items produced, and they do not all weigh exactly 90 grams. The distribution of weights can be approximated by a Normal distribution with a mean of 90 grams and a standard deviation of 1 gram. What percentage of the items will either weigh less than 87 grams or more than 93 grams?
A) 6%
B) 94%
C) 99.7%
D) 0.3%

46. Using the standard Normal distribution tables, what is the area under the standard Normal curve corresponding to $Z < 1.1$?
A) 0.1357
B) 0.2704
C) 0.8413
D) 0.8643

47. The variable Z has a standard Normal distribution. Find the value z such that the event $Z > z$ has proportion of 0.08.
A) $z = -1.41$
B) $z = 0.53$
C) $z = 0.82$
D) $z = 1.41$

Use the following to answer questions 48–50:

A market research company employs a large number of typists to enter data into a computer database. The time it takes for potential new typists to learn the computer system is known to have a Normal distribution with a mean of 90 minutes and a standard deviation of 18 minutes. A candidate is automatically hired if she learns the computer system in less than 100 minutes. A cut-off time is set at the slowest 10% of the learning distribution. Anyone slower than this cut-off time is definitely not hired.

48.   What proportion of candidates takes more than two hours to learn the computer system?
A)   0.048
B)   0.452
C)   0.711
D)   0.952

49.   What proportion of candidates will be hired automatically?
A)   0.048
B)   0.452
C)   0.711
D)   0.952

50.   What is the cut-off time the market research company uses?
A)   1 hour and 7 minutes
B)   1 hour and 53 minutes
C)   2 hours
D)   2 hours and 8 minutes