

Name _____ Section _____

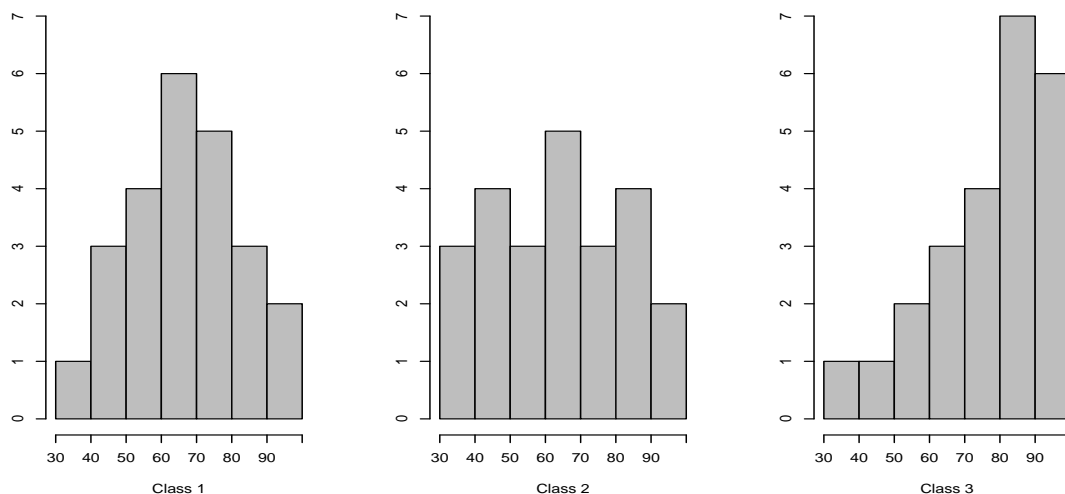
In each of the following multiple choice questions choose the **single best** answer. Each multiple choice question is worth 4 points.

1. The fraction of the variation in the values of y that is explained by the least-squares regression of y on x is
 - A) the correlation coefficient
 - B) the slope of the least-squares regression line.
 - C) the square of the correlation coefficient.
 - D) the intercept of the least-squares regression line.
2. An incoming freshman took her college's placement exams in French and mathematics. In French, she scored 82 and in math, 84. The overall results on the French exam had a mean of 72 and a standard deviation of 8, while the mean math score was 70 with a standard deviation of 12. On which exam did she do better compared with the other freshmen?
 - A) French
 - B) mathematics
 - C) She did equally well on both exams.
 - D) It is not possible to tell because we do not know the correlation coefficient.
3. The correlation between height and weight in a sample of adult males was computed to be 0.776. The correlation between weight and height is
 - A) -0.776
 - B) 0.776
 - C) 0.677
 - D) 0.224
4. What is the median of the following list of numbers?

80 10 30 60 10 90 50

 - A) 60
 - B) 50
 - C) 66
 - D) 10

5. Three Statistics classes, each with 24 students, all took the same test. Histograms of the scores for each class are shown below. Which class had the highest median score?



- A) Class 1
 B) Class 2
 C) Class 3
 D) Cannot tell.
6. A small college has 600 Freshmen, 400 Sophomores, 300 Juniors, and 250 Seniors. A simple random sample of 50 undergraduates is taken from each of these categories, giving a combined sample of 200 students. This is an example of
- A) a simple random sample.
 B) a matched sample.
 C) a stratified random sample.
 D) a multistage sample.

In an investigation of environmental causes of disease, data were collected on the annual mortality rate (deaths per 100,000) for males in 61 large towns in England and Wales. In addition, the water hardness was recorded as the calcium concentration (parts per million, ppm) in the drinking water. The regression equation is

$$mortality = 1676 - 3.23calcium$$

and $r^2 = 0.43$. Use this information to answer the following 2 questions.

7. The correlation coefficient is
- A) 0.66
 B) 0.43
 C) -0.66
 D) -0.43

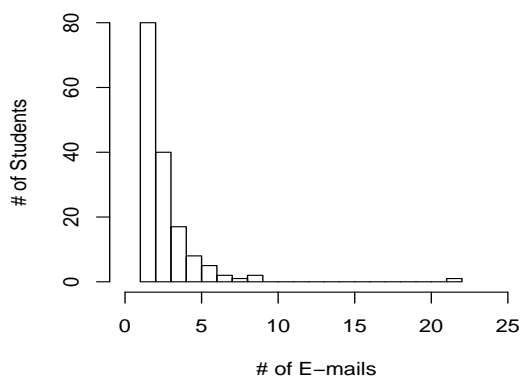
8. The predicted mortality rate in a town with 60ppm calcium is
- A) 1676
 - B) 3.23
 - C) -193.8
 - D) 1482.2
9. Which of the following numerical summary statistics is not sensitive to outliers?
- A) the mean.
 - B) the standard deviation.
 - C) the correlation coefficient.
 - D) the median.
10. If a distribution is skewed to the left then
- A) the mean is greater than the median.
 - B) the median is greater than the mean.
 - C) the mean and median are the same.
 - D) there is not a consistent relationship between the mean and median.

The distribution of scores for persons over 16 years of age on the Wechsler Adult Intelligence Scale (WAIS) is approximately normal with mean $\mu = 100$ and standard deviation $\sigma = 10$. Use this information to answer the following 2 questions.

11. What proportion of the individuals has a WAIS score of 105 or higher?
- A) 0.6915
 - B) 0.3085
 - C) 0.5000
 - D) 0.4129
12. A person who took the WAIS test tells you her score was the 50th percentile of all scores. What score did she have?
- A) 100
 - B) 110
 - C) 90
 - D) 105

13. One reason to invest abroad is that markets in different countries do not move in step. When American stocks go down, foreign stocks may go up. So an investor who holds both bears less risk. Now we learn the correlation between changes in American and European share prices has risen from 0.4 in the mid-1990's to 0.8 in 2000. This fact suggests
- A) an increase in the protection provided by buying both American and European stocks.
 - B) a decrease in the protection provided by buying both American and European stocks.
 - C) no change in the protection provided by buying both American and European stocks.
 - D) that there has been a change in the protection provided by buying both American and European stocks, but we cannot tell if protection has increased or decreased.
14. Sickle-cell disease is a painful disorder of the red blood cells that affects mostly blacks in the United States. To investigate whether the drug hydroxyurea can reduce the pain associated with sickle-cell disease, a study by the National Institutes of Health gave hydroxyurea to 150 sickle-cell sufferers and a placebo to another 150. The researchers then counted the number of episodes of pain reported by each subject. The factor is
- A) the drug received
 - B) the number of episodes of pain.
 - C) the presence of sickle-cell disease.
 - D) the number of red blood cells.
15. An advice columnist asked readers the following question, "If you had it to do over again, would you have children?" More than 10,000 readers responded and 70% of them said "No". The shocked columnist concluded these results showed that most parents in America regretted having children. A more carefully designed probability based survey conducted a short time later showed that about 90% of parents were happy with the decision to have children. The difference is likely due to
- A) the two surveys being conducted at different points in time.
 - B) the columnist's survey being biased by voluntary response among readers of her column.
 - C) the second survey being biased because it did not focus on readers of advice columns.
 - D) the second survey being biased because it used impersonal chance to select the respondents.
16. A researcher wants to see how well a child's height at age 6 predicts his or her height at age 16. The explanatory variable is
- A) a child.
 - B) height at age 6.
 - C) height at age 16.
 - D) unknown until we plot the data.

A university teacher saved every e-mail received from students in a large introductory statistics class during the entire term. He then counted, for each student who had sent him at least one e-mail, how many e-mails each student had sent. The histogram is shown below. Use it to answer the following two questions.



17. Which of the following is the best description of the shape of the histogram?
 - A) Symmetric with an outlier.
 - B) Skewed right with an outlier.
 - C) Skewed left with an outlier.
 - D) Skewed right.
18. Which is the more appropriate measure of the center?
 - A) The mean.
 - B) The Interquartile Range.
 - C) The median.
 - D) The midpoint.

In each of the following True/False questions circle the best answer. Each True/False question is worth 2 points.

19. **TRUE** **FALSE**
The histograms of 2 distributions with the same mean and standard deviation must have the same shape.
20. **TRUE** **FALSE**
A correlation of -0.772 between Gross Domestic Product and infant mortality rate shows that there is almost no association between these 2 variables.
21. **TRUE** **FALSE**
Probability sampling designs use impersonal chance to select a sample.
22. **TRUE** **FALSE**
Extrapolation is the use of a regression line for predicting far outside the range of values of the explanatory variable x that was used to obtain the line.
23. **TRUE** **FALSE**
Blocking and matched-pairs designs are a way of reducing the effect of variation among experimental units.

24. Read each of the brief reports of statistical research and indicate whether it was an experiment or an observational study. Circle (carefully) the correct answer. If we cannot tell which answer is circled you will not receive credit. (2 points each).

A) Over a 4-month period, among 30 people with bi-polar disorder, patients who were given a high dose (10g/day) of omega-3 fats from fish oil improved more than those given a placebo.

Experiment Observational study

B) In a test of roughly 200 men and women, those with a moderately high blood pressure(averaging 164/89 mm of mercury) did worse on tests of memory than those with normal blood pressure.

Experiment Observational study

25. For each of the following variables, indicate whether the variable is categorical or quantitative. Circle (carefully) the correct answer. If we cannot tell which answer is circled you will not receive credit. (2pts each)

A) Hours of sleep last night.

Categorical Quantitative.

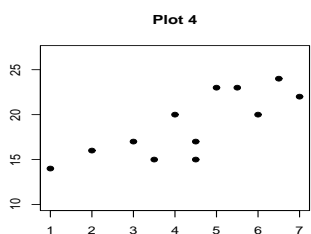
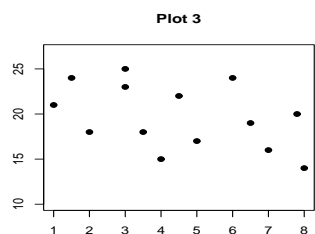
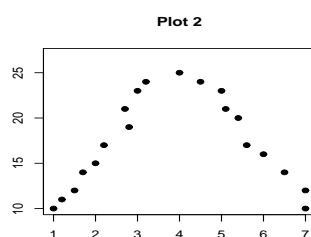
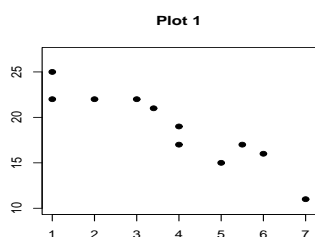
B) Head circumference (cm).

Categorical Quantitative

C) Whether or not a person believes in love at first sight (Yes, No).

Categorical Quantitative

26. Here are several scatterplots. The calculated correlations are -0.923, -0.487, 0.006, and 0.777. Match each plot with it's correct correlation coefficient. (4 points)



A) -0.923 _____

B) -0.487 _____

C) 0.006 _____

D) 0.777 _____

You must show your work on the following problems to receive credit.

27. A specialty foods company sells "gourmet hams" by mail order. The hams vary in size from 4.15 to 7.45 pounds, with a mean weight of 6 pounds and standard deviation of 0.65 pounds.
- A) If the weights of the hams were expressed in ounces (1 pound=16 ounces) what would the mean and standard deviation be (in ounces). (2 points)
- B) When the company ships these hams, the box and packing materials add 1.5 pounds. What are the mean and standard deviation of the boxed hams (in pounds) when shipped? (2 points)
28. Young hens tend to lay smaller eggs, often weighing less than the desired minimum weight of 54 grams. The average weight of eggs produced by young hens is 50.9 grams, and only 20% of their eggs exceed the desired minimum weight. If a Normal model is appropriate, what would be the standard deviation? (4 points)