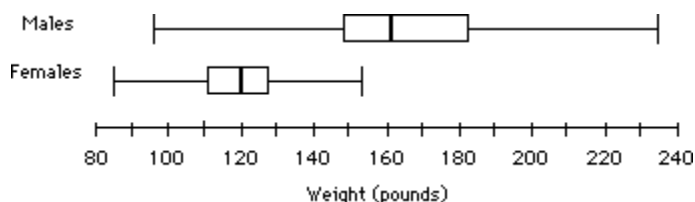


1. An English survey of 3000 medical records showed that smokers are more inclined to get depressed than non-smokers. Does this imply that smoking causes depression?
2. True or False?
  - a. The average height in a class is 60 inches. There are 30 people in the class. One can conclude that 15 of the students are less than 60 inches tall.
  - b. The average of a list of numbers cannot be smaller than its SD.
  - c. If two lists have the same average and SD, their histograms must be the same.
  - d. The SD is never negative
  - e. If the SD of a list of numbers is zero, then its average must also be zero.
  - f. f. If the SD of a list of numbers is zero, then the numbers must all be the same.
  - g. If ten is added to each number in a list, the SD is increased by ten.
  - h. If the right-hand tail of a histogram is longer than the left hand tail, then the median is greater than the average.
3. The median score on a test was 24 points (out of 50 points). The histogram of the scores follows the normal curve closely. Someone you know tells you he scored 34 points and ranked ahead of 84% of the class. You scored 39 points. What is your rank?
4. There is a rare neurological disease (idiopathic hypoguesia) that makes food taste bad. It is sometimes treated with zinc sulfate. One group of investigators did two randomized controlled experiments to test this treatment. In the first trial, the subjects did not know whether they were being given zinc sulfate or placebo. However, the doctors doing the evaluation did know. In this trial, patients on zinc sulfate improved significantly; the placebo group showed little improvement. The second trial was done double blind: neither the subjects nor the doctors doing the evaluation were told who had been given the drug or placebo. In the second trial, zinc sulfate had no effect. Should zinc sulfate be given to treat the disease? Yes or No and explain briefly.
5. A carpenter is measuring the distance between five points A, B, C, D, and E. They are all on a straight line. She finds that each of the four distances AB, BC, CD, and DE measure one yard, give or take an inch or so. These measurements are made independently, by the same procedure. The distance from A to E is \_\_\_\_\_, give or take \_\_\_\_\_ or so.
6. According to a recent Gallup poll, about 60% of all American adults owned a cell phone at the time of the poll. The results are based on telephone interviews with a randomly selected national sample of 998 adults, 18 years and older, conducted March 30-April 2, 2001. The margin of error was reported to be 3.5%. Which of the following statements correctly interprets the reported margin of error of 3.5%?
  - a. The probability that a 95% confidence interval based on this poll does not cover the population proportion is 3.5%.
  - b. In about 95% of all random samples of this size from the same population, the difference between the sample percent and the population percent will be more than 3.5%.
  - c. In about 95% of all random samples of this size from the same population, the difference between the sample percent and the population percent will be less than 3.5%.

- d. In about 3.5% of all random samples of this size from the same population, the sample percent will equal the population percent.
7. A researcher conducts a study to determine whether or not taking Vitamin C prevents colds. What is the explanatory variable in this study?
- Whether or not one gets colds.
  - Whether or not one is a participant in the study.
  - Whether or not one takes Vitamin C.
  - Whether or not one knows which treatment one is taking.
8. In a city, 20% of the workers have incomes over \$40,000 per year. If 1600 workers are chosen at random with replacement, what is the chance that between 320 and 336 of those chosen have incomes over \$40,000 per year?
9. The weights of the male and female students in a class are summarized in the following boxplots:



Which of the following is **not** correct?

- About 50% of the male students have weights between 150 and 185 pounds.
  - About 25% of female students have weights more than 130 pounds.
  - The median weight of males is about 162 pounds.
  - The mean weight of female students is about 120 because of symmetry.
  - The male students have less variability than the female students.
10. In a city, 20% of the workers have incomes over \$40,000 per year. If 1600 workers are chosen at random with replacement, what is the chance that between 320 and 336 of those chosen have incomes over \$40,000 per year?
11. An air-traffic control error is said to occur when planes come too close to one another. The following data represent the number of air-traffic control errors for a random sample of 18 regions around the United States for the year 2000.
- 7 8 8 14 17 18 21 27 28 33 34 34 38 40 54 71 74 102
- Calculate the IQR for the data
  - Are there any outliers in the data set? Explain.
  - Construct a boxplot for the data. Write a one sentence interpretation of your graph.

12. Assume that the current starting salaries of all college graduates with a computer science major have a normal distribution with a mean of \$41,949 and a standard deviation of \$2500. Find the proportion of college graduates with a computer science major who have a starting salary between \$38,642 and \$43,299
13. A variable whose value is a numerical outcome of a random phenomenon is called
- a random variable
  - a parameter
  - biased
  - a random sample
14. EPA fuel economy estimates for automobile models tested recently predicted a mean of 25 mpg with a standard deviation of 6 mpg for highway driving. The distribution of fuel economy follows a bell curve.
- Sketch the curve for the distribution of fuel economy. Clearly label the x-axis showing what the 1-2-3 (68-95-99.7 rule predicts about miles per gallon.
  - About what percent of cars should get between 19 and 31 mpg?
  - Describe the gas mileage of the worst 2.5% of all cars?
15. The probability of event A is 0.4. The probability of event B is 0.6. If A and B are disjoint events, then:
- $P(A \text{ and } B) = 0.24$
  - $P(A \text{ and } B) = 1.0$
  - $P(A \text{ or } B) = 0$
  - $P(A \text{ or } B) = 1.0$
16. True or False? If two events, A and B, are independent, the conditional probability that B happens, given that A does not happen, is the same as the conditional probability that B happens, given that A happens.
17. A roulette wheel has 38 slots, numbered 0, 00, and 1 to 36. The slots 0 and 00 are colored green, 18 of the others are red, and 18 are black. The dealer spins the wheel and at the same time rolls a small ball along the wheel in the opposite direction. The wheel is balanced so that the ball is equally likely to land in any slot when the wheel slows.
- What is the probability of any one of the 38 possible outcomes?
  - If you bet on red, you win if the ball lands in a red slot. What is the probability of winning if you bet on red?

18. The price per share for common stock of the 100 largest U.S. corporations has a mean of \$285 and a median of \$57. We can conclude:
- The distribution of the price per share is symmetric.
  - The distribution of the price per share is skewed to the right.
  - The distribution of the price per share is skewed to the left.
  - This cannot possibly be correct - there is too large a discrepancy between the mean and median.
19. A box contains five white balls and one red ball. Four draws are made with replacement. What is the chance of getting exactly one red ball?
20. The amount of money spent by students for textbooks in a semester is a normally distributed random variable with a mean of \$235 and a standard deviation of \$15.
- Find the proportion of students who spend more than \$270 on textbooks in a semester.
  - What proportion of students spend between \$220 and \$250 on textbooks in any semester?
  - 20% of students will spend more than what amount on textbooks in a semester?
21. A group of adults aged 20 to 80 were tested to see how far away they could first hear an ambulance coming toward them. An equation describing the relationship between distance (in feet) and age was found to be  $\hat{y} = 600 - 3x$ , and 75% of the variation in distance can be explained by the age of the adult.
- What is the response variable, distance or age?
  - How far away would you predict a 50-year-old person could first hear an ambulance coming toward him?
  - Suppose a 50 year old could actually hear an ambulance at 400 feet. What is the residual for this person?
22. A study of college graduates is conducted relating the age at which they began college to the age at which they graduated. The regression line to estimate age at graduation from age at

entrance is computed, as is the correlation coefficient. The slope of the regression line must be closest to:

- a. 4 years/year
- b. 18 years/year
- c. 1 year/year
- d. 20 years/year

23. A GPA-LSAT study shows that the slope for estimating LSAT from GPA is about 100 LSAT points per GPA point. Which of the following is(are) true?

- a. If one person has twice the GPA of another, his/her estimated LSAT score is 100 points higher than the other's.
- b. If two people differ by 1.5 points in GPA, you can expect their LSAT scores to differ by about 150 points.
- c. A person with a GPA of 3.5 will score, on average,  $3.5(100)=350$  on the LSAT.
- d. The SD of LSAT scores is 100 times the SD of the GPA scores in the group studied.

24. In a certain city, if the weather bureau forecasts rain, they are right 80% of the time. If they forecast no rain, they are right 70% of the time. In a given period of 10 years, rain is forecast 20% of the days. What percentage of the days did rain fall?

25. The relationship between depth of flooding and the amount of flood damage was examined in the paper "Significance of Location in Computing Flood Damage". The accompanying data on depth of flooding ( $x$ : feet above first-floor level) and flood damage ( $y$ : percent of structure value) was obtained using a sample of flood insurance claims

$$n=13 \quad \bar{X}=7 \quad \bar{Y}=36.2 \quad s_x=3.89 \quad s_y=13.31 \quad r=0.93$$

a. Calculate the equation of the regression line.

b. Predict flood damage for a structure subjected to 6.5 ft of flooding.

c. Explain what the slope of the line means in terms of how flood damage changes with depth of flooding.