

STATISTICS 2023

NAME, IN PRINT _____ *Key*

EXAM ONE

SIGNATURE, IN INK _____

FALL 2018

CWID IN INK _____

SEAT LETTER & NUMBER IN INK _____

This exam will be returned to you through SLIC; once you pick it up retain it for grade verification.
TRUE OR FALSE. Answer with a capital T or F (3 points each)

F

1. Frequency tells the proportion of data in a certain category.

T

2. If the mean of a data set is less than the median and the median is less than the mode of the data set, then the distribution is left skewed.

F

3. If a data set is assumed to be mound-shaped, then approximately 5% of the data set would lie outside of the interval of values which are within one standard deviation of the mean.

T

4. Data that are interval or ratio are appropriate for a histogram and data that are nominal or ordinal are appropriate for a bar chart.

T

5. The third quartile of a data set is a value that 75% of the data are less than and 25% of the data are more than.

T

6. If the z-score is 2.2 for an individual data value from a data set with mean of 24 and variance of 16 then the individual data value is equal to 32.8.

F

7. The mean is the middle of the data and the median is the balance point of the data.

State the Answer. State the answer on the line given.

(3 points each)

The daily changes in the value of a stock are listed below for 5 days of trading. Use these data to answer the remainder of the questions on this page.

2.55

-1.82

-1.24

3.84

0.55

$n = 5$

26.4006

8. What is the value of the sum of squares? State 4 digits past the decimal.

$$\sum x^2 = 2.55^2 + (-1.82)^2 + \dots + 0.55^2 = 26.4006$$

0.78

9. What is the value of the sample mean for these five values? Round your answer to 2 digits past the decimal.

$$\bar{x} = \frac{\sum x}{n} = \frac{2.55 + (-1.82) + \dots + 0.55}{5} = .776 \approx .78$$

2.42

10. What is the value of the sample standard deviation for these five values? Round your answer to 2 digits past the decimal.

$$s = \sqrt{\frac{\sum x^2 - (\bar{x})^2}{n-1}} = \sqrt{\frac{26.4006 - \frac{3.88^2}{5}}{4}} = 2.4181 \approx 2.42$$

STATE THE ANSWER. State the answer on the line given.

884

11. If there are 3400 observations in a data set, how many observations are in a certain category which has relative frequency of .26?

3

$$\text{Rel Freq} = \frac{\text{Freq}}{n} = \frac{?}{3400} = 0.26 \Rightarrow ? = 0.26(3400) = 884$$

12. If a data set with five hundred observations had one hundred ones, fifty twos, two hundred threes, one hundred fifty fours what is the numerical value of the median?

10

$$1, \dots, 1_{100}, 2_{101}, \dots, 2_{150}, 3_{151}, \dots, 3_{350}, 4_{351}, \dots, 4_{500}$$

13. If a sample with 11 observations has a sum equal to 110 and a sum of squares equal to 1460, then what is the value of the sample mean?

6

$$\bar{X} = \frac{\sum X}{n} = \frac{110}{11} = 10$$

14. If a sample with 11 observations has a sum equal to 110 and a sum of squares equal to 1460, then what is the value of the sample standard deviation?

25%

$$S = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}} = \sqrt{\frac{1460 - \frac{110^2}{11}}{10}} = \sqrt{36} = 6$$

15. If a data set with unknown shape has a mean of 212 and a standard deviation of 18 at most what percent of the observations would lie outside of the interval (176, 248)?

Interval contains at least 75% inside so
25% at most outside.

Great Blue heron live around ponds, lakes, marshes, and other waterways in Oklahoma. A random sample of six of these birds was chosen in Payne and Pawnee Counties of Oklahoma. The standing height was measured on each bird. The heights recorded in inches are stated below. Use this sample of standing heights of great blue heron to answer the remainder of the questions on this page. $44.8, 42.1, 49.9, 41.7, 44.2, 43.2$ $\sum X = 265.9$
 $\sum X^2 = 11,828.23$

11,828.23

16. What is the numerical value of the sum of the squares for the above sample?

$$\sum X^2 = 44.8^2 + \dots + 43.2^2 = 11,828.23$$

70,702.81

17. What is the numerical value of the square of the sum for the above sample?

$$(\sum X)^2 = 265.9^2 = 70,702.81$$

44.3

18. What is the numerical value of the mean of the above sample of heights?

Round to one digit past the decimal.

$$\bar{X} = \frac{\sum X}{n} = \frac{265.9}{6} = 44.316 \approx 44.3$$

43.7

19. What is a numerical value for the median of the above sample of heights?

$$41.7 \quad 42.1 \quad 43.2 \quad 44.2 \quad 44.8 \quad 49.9$$
2.98

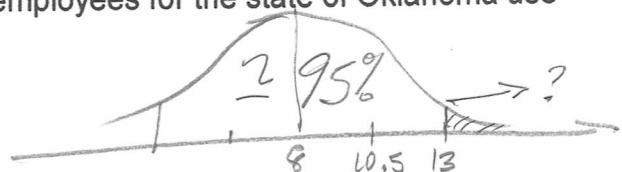
median is $\frac{43.2 + 44.2}{2} = 43.7$

20. What is the numerical value of the standard deviation of the above sample of heights? Round your answer to two digits past the decimal.

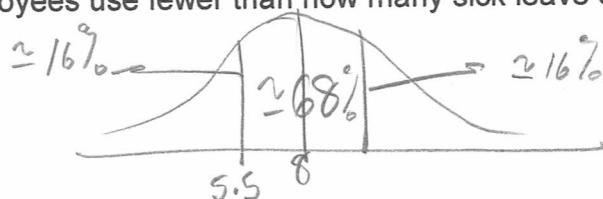
$$S = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{n}}{n-1}} = \sqrt{\frac{11,828.23 - \frac{265.9^2}{6}}{5}} = 2.98088$$

Assume that the number of days of sick-leave used in a year by state employees for the state of Oklahoma has a mound-shaped distribution with a mean of 8 days and a standard deviation of 2.5 days. Use this information to answer the questions on this page.

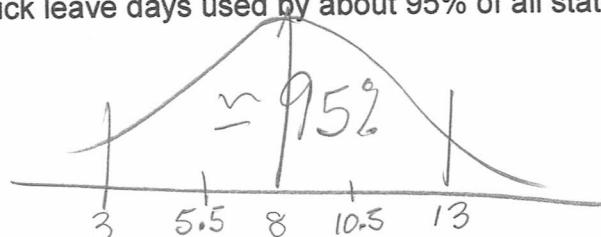
2.5% 21. Approximately what percent of state employees for the state of Oklahoma use more than 13 days of sick leave in a year?



5.5 22. About 16% of the state employees use fewer than how many sick leave days in a year?



3, 13 23. The number of sick leave days used by about 95% of all state employees is between what two values?



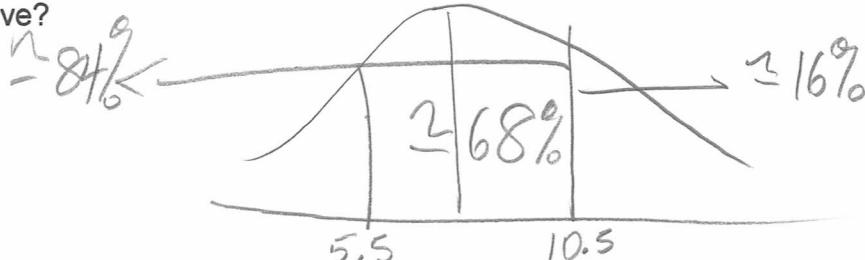
2.4 24. If an employee uses 14 days of sick leave, what is the z-score associated with the employee's value?

$$z = \frac{14 - 8}{2.5} = 2.4$$

2.75 25. If an employee has a z-score of -2.1, what is the number of days of sick leave associated with that employee?

$$X_{z=-2.1} = \bar{X} + zS = 8 + (-2.1)2.5 = 2.75$$

10.5 26. What is the approximate 84th percentile of this distribution of the annual number of days of sick leave?



0.98

27. Two computers on the same network both function properly 92% of the time. If one of the computers functions properly 96% of the time and the other computer functions properly 94% of the time, what percent of the time is one or the other computer functioning properly? $P(C_1 \cap C_2) = .92, P(C_1) = .96, P(C_2) = .94$

0.12

28. Thirty percent of all drivers have a vehicle accident. The probability that a driver's automobile insurance goes up if he or she has an accident is 0.4. Based on this information what is the probability that an individual driver will have an accident and their automobile insurance will increase in price? $P(\text{accident}) = .30, P(\text{UP} | \text{Accident}) = .40$

$$P(\text{accident} \cap \text{UP}) = P(\text{UP} | \text{accident}) \cdot P(\text{accident}) = .40(.30) = .12$$

A very low percentage of college students who are eligible to vote actually cast a ballot, partly due to the need for an absentee ballot, since they are not living in their home voting district. Five hundred college students were questioned about whether they voted in the 2016 election and whether they planned to vote in the 2018 election. The results are shown in the following table. Use these data to answer the remaining questions on this page. State ratio answers; do not calculate to decimal answers.

| | | Voted in the 2016 Election | |
|------------------------------------|-----|----------------------------|-----|
| | | YES | NO |
| Plans to vote in the 2018 Election | YES | 102 | 242 |
| | NO | 38 | 118 |

1403601400140500

29. If one student is chosen at random, what is the probability that the student did vote in the 2016 election?

102140

30. If the one student chosen at random voted in the 2016 election, what is the probability that the student plans to vote in the 2018 election?

242360

31. Given that a student who did not vote in the 2016 election was chosen, what is the probability that the student plans to vote in 2018?

102500

32. What is the probability that if one student is chosen at random that the student did vote in 2016 and plans to vote in 2018?

258500

33. What is the probability that if one student is chosen at random that the student did vote in 2016 or does not plan to vote in 2018?