

Once this exam is graded and returned to you retain it for grade verification.

TRUE OR FALSE. Answer with a capital T or F.

(3 points each)

F

1. Histograms are bar graphs for categorical data that is ordinal or nominal.

F

2. The mean and the median of a data set are the same value since the mean is the average and the median splits the data set down the middle.

F

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

T

4. The median of a data set is always the 50th percentile of the data set.

F

5. If the z score is -2.4 for an individual data value from a population with mean of 56 and standard deviation of 7 then the individual data value is equal to 34.4.

$$z = \frac{x - \bar{x}}{s} = \frac{34.4 - 56}{7} = 39.2 \neq 34.4$$

T

6. If a data set is mound shaped with a mean of 20 and a standard deviation of 5 then about 68% of the observations would be between 15 and 25.

$$68\% \text{ are between } \bar{x} \pm s \Rightarrow 20 \pm 5 \Rightarrow (15, 25)$$

T

7. The probability of an event is a number between the values of 0 and 1, including 0 and 1, which indicates the likelihood of the event.

State the Answer. State the answer on the line given

(3 points each)

The weekly changes in a major stock were recorded for 8 weeks during the past summer. The changes in percent are stated below. Use these data to answer the remaining questions on this page.

2.1 5.2 1.8 -3.4 1.1 -2.2 0.8 -0.4

5

8. What is the sum of the data?

$$\sum x = x_1 + \dots + x_n = 2.1 + 5.2 + \dots + (-.4) = 5$$

53.1

9. What is the sum of the squares of the data?

$$\sum x^2 = x_1^2 + \dots + x_n^2 = 2.1^2 + 5.2^2 + \dots + (-.4)^2 = 53.1$$

25

10. What is the square of the sum of the data?

$$(\sum x)^2 = (x_1 + \dots + x_n)^2 = 5^2 = 25$$

96

11. How many observations are in a category if the data set has 400 observations and the relative frequency of the category is 0.24?

$$\text{relative freq} = \frac{\text{freq}}{n} \Rightarrow 0.24 = \frac{x}{400} \Rightarrow x = 0.24(400) = 96$$

41

12. If from a data set with 200 observations the sum of squares is 7,197.62 and the sum is 82, what is the value of the sample mean? State your answer with two digits past the decimal.

6

$$\sum x = 82, \bar{x} = \frac{\sum x}{n} = \frac{82}{200} = .41$$

13. If from a data set with 200 observations the sum of squares is 7,197.62 and the sum is 82, what is the value of the sample standard deviation?

7

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}} = \sqrt{\frac{7,197.62 - \frac{82^2}{200}}{199}} = \sqrt{36} = 6$$

14. If a data set with ten thousand observations has 3000 sevens, 4500 eights, and 2500 nines, what is the numerical value of the first quartile?

75

$$7, \dots, 7_{3000}, 8_{3001}, \dots, 8_{7500}, 9_{7501}, \dots, 9_{10,000}$$

2500 and 2501 places are 7's. $Q_1 = 7$

15. If a data set with unknown shape has a mean of 120 units and a standard deviation of 14 units, then at least what percent of the data would be between the values 92 and 148?

$$92, 148 \Rightarrow \bar{x} \pm 2s \Rightarrow 120 \pm 14 \Rightarrow 92, 148$$

Interval within two standard deviations of the mean contains at least 75% of the data in an unknown shape.

The early summer of 2014 in central Oklahoma was not very hot, but the last few days of August were all at, or above, the average high temperature for that date. The following data are the daily high temperatures in Stillwater, Oklahoma between August 24 and August 31, 2014. Use these data to answer the remaining questions on this page.

103, 103, 101, 99, 98, 90, 99, 100

$$\sum x = 793$$

$$\sum x^2 = 78,725$$

99.125

16. What is the mean of these 8 observations of daily high temperatures? State your answer with three digits past the decimal.

$$\bar{x} = \frac{\sum x}{n} = \frac{793}{8} = 99.125$$

99.5

17. What is the median of these 8 observations of daily high temperatures?

90 98 99 99 100 101 103 103

4.1299.5

18. What is the standard deviation of these 8 observations of daily high temperatures? Round your answer to two digits past the decimal.

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}} = \sqrt{\frac{78,725 - \frac{793^2}{8}}{7}} = \sqrt{16.98} = 4.12$$

59

19. The grade distribution of a certain chemistry test has a mean of 52 with a standard deviation of 14. What is the value of a student's exam grade if the z score associated with the grade is 0.5?

$$\text{If } z = .5 \Rightarrow x = ?$$

$$x = \bar{x} + zs = 52 + (.5)14 = 59$$

-1.2

20. The wait time at a certain pharmacy has a mean of 44 minutes with a standard deviation of 8 minutes. When you were last at that pharmacy your wait time was 34.4 minutes. What is the value of the z score based on your wait time of 34.4 minutes?

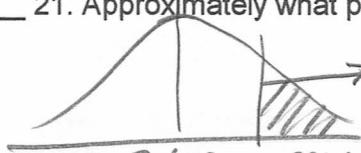
$$\text{If } x = 34.4, z = ?$$

$$z = \frac{x - \bar{x}}{s} = \frac{34.4 - 44}{8} = -1.2$$

The monthly travel expenses in a small company have a mound-shaped distribution with a mean of \$2,600 and a standard deviation of \$225. Use this information to answer the remainder of the questions on this page.

16%

21. Approximately what percent of the months have travel expenses greater than \$2,825?



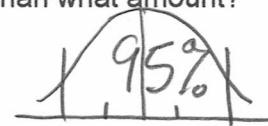
$$z_{x=2825} = \frac{2825 - 2600}{225} = 1$$

2,150

22. About 0.025 or 2.5% of the month's travel expenses are less than what amount?

2.5% less than $\bar{x} - 2s$

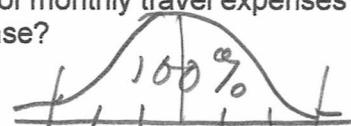
$$\bar{x} - 2s = 2,600 - 2(225) = 2,150$$

3,275

23. Based on the description of the distribution of monthly travel expenses provided above, what is the approximate highest monthly travel expense?

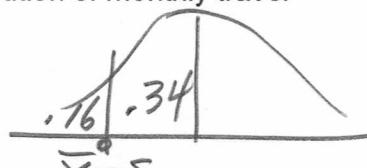
highest

$$\bar{x} + 3s = 2,600 + 3(225)$$

2,375

24. What is the value of the 16th percentile in the distribution of monthly travel expenses?

$$\bar{x} - s = 2,600 - 225 = 2,375$$

- .8

25. For one month the travel expense was \$2,420. What is the value of the z-score associated with that month's observed expenses?

If $x = 2,420$ then $z = ?$

$$z = \frac{x - \bar{x}}{s} = \frac{2420 - 2600}{225} = - .8$$

26. If the z-score associated with a month's observed travel expenses was 2.4, what is the value of the month's travel expenses?

If $z = 2.4$, then $x = ?$

$$x = \bar{x} + z s = 2,600 + 2.4(225) = 3,140$$

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

(3 points each)

.36

• 26 27. Will and Chelsea are two freshman at Oklahoma State University. Each of them has a 20% chance of making a four-point grade average during their first semester. Assuming their academic performance is independent, what is the chance that Will or Chelsea will make a four-point? $P(\text{Will}) = .2$ $P(\text{Chelsea}) = .2$ $P(\text{Will and Chelsea}) = P(\text{Will}) \cdot P(\text{Chelsea}) = .2 \cdot .2 = .04$

$$\begin{aligned} P(\text{Will} \cup \text{Chelsea}) &= P(\text{Will}) + P(\text{Chelsea}) - P(\text{Will} \cap \text{Chelsea}) \\ &= P(\text{Will}) + P(\text{Chelsea}) - P(\text{Will}) \cdot P(\text{Chelsea}) \\ &= .2 + .2 - .2 \cdot .2 \end{aligned}$$

.24

28. Many homeowners in Oklahoma are now purchasing additional insurance to cover earthquake damage due to the increased number of earthquakes in the state. Assume that 60% of the homes in an area are insured. Of the homes that are insured, 40% of those now also carry additional coverage for earthquake damage. What is the probability that a home in that area has insurance and has the additional coverage for earthquake damage?

$$P(\text{insured}) = .6, P(\text{earthquake} \mid \text{insured}) = .40$$

$$P(\text{insurance} \cap \text{earthquake}) = P(\text{earthquake} \mid \text{insured}) \cdot P(\text{insured}) = .6 \cdot .40$$

Four hundred college students were questioned about whether or not they plan to attend an OSU Celebration Event. The student's classifications in school were also recorded. The results are shown in the following table. Use this table to answer the remainder of the questions on this page. Do not reduce fractional answers.

Classification in School at Oklahoma State University				
Plan to attend OSU Event?	Freshman	Sophomore	Junior	Senior
Yes	44	78	68	48
No	34	48	36	44

$$\begin{array}{r} 238 \\ \hline 78 \end{array} \quad \begin{array}{r} 126 \\ \hline 104 \end{array} \quad \begin{array}{r} 92 \\ \hline 400 \end{array}$$

400 29. What is the probability of choosing a student who is planning to go to the OSU Celebration Event? Do not reduce fractional answers.

44
78

18 30. If the one student chosen is a freshman, what is the probability that the student is planning to go to the OSU Celebration Event?

$$\frac{68}{238}$$

250 31. Given that a student who plans to go to the OSU Celebration Event is chosen, what is the probability that the student is a junior in college?

$$\frac{44}{400}$$

400 32. What is the probability that if one student is chosen, that the student does not plan to go to the OSU Celebration Event and is a senior in college?

286
400

400 33. What is the probability that if one student is chosen, that the student plans to go to the OSU Celebration Event or is a sophomore in college?