STATISTICS 2023 **NAME, PRINT IN INK** Key

EXAM ONE **SIGNATURE IN INK**_____

FALL 2008 **CWID IN INK**_____

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

TRUE OR FALSE. Answer with a capital T or F. **(3 points each)**

F 1. The number of fouls in a soccer game is a qualitative variable.

T 2. The mean is more affected by extreme values in the data than are the median and mode.

F 3. If nothing is known about the shape of a data set then the interval of values that is within three standard deviations of the mean may contain no values or it may contain all the values in the data set.

T 4. A box and whiskers plot provides information about the minimum, maximum, and the quartile values in a data set.

T 5. If the z score is -1.84 for an individual data value from a population with mean of 74 and standard deviation of 2 then the individual data value is equal to 70.32.

F 6. The eighty-fourth percentile of a mound shaped data set is a point that is approximately two standard deviations above the mean.

T 7. Conditional probability is the probability of an event assuming that another event has occurred or that a specific condition is true.

For the remainder of the questions on this page use the following sample of data.

25, 42, 34, 15, 22.

$\Sigma x = 138$ $\Sigma x^2 = 4,254$

27.6 8. State the numerical value of the mean of the data set. State your answer with one digit past the decimal. $\bar{x} = \frac{\Sigma x}{n} = \frac{138}{5} = 27.6$

10.5 9. State the numerical value of the standard deviation of the data set. Round your answer to one digit past the decimal.

$$s = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}} = \sqrt{\frac{4,254 - \frac{138^2}{5}}{4}} = 10.549$$

STATE THE ANSWER. State the answer on the line given. (3 points each)

.025 10. If a segment of a pie chart is an arc of 9 degrees what is the relative frequency for the category of the variable represented by that segment of the pie chart? $360(\text{rel freq}) = 9 \Rightarrow \frac{9}{360} = .025$ is rel freq

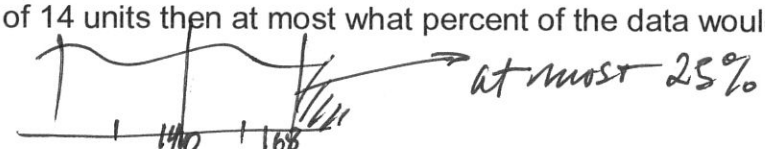
500 11. How many observations are in a data set if a category with 20 observations has a relative frequency of 0.04? $\frac{20}{n} = .04 \Rightarrow n = \frac{20}{.04} = 500$

17.5 12. Assume from a sample of 278 observations the sufficient statistics are the following values. The sum is 4,865 and the sum of squares is 86,245.5. What is the numerical value of the sample mean? State your answer with one digit past the decimal. $\bar{X} = \frac{\Sigma X}{n} = \frac{4,865}{278} = 17.5$

2 13. Assume from a sample of 278 observations the sufficient statistics are the following values. The sum is 4,865 and the sum of squares is 86,245.5. What is the numerical value of the sample standard deviation? $S = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}} = \sqrt{\frac{86,245.5 - \frac{4,865^2}{278}}{277}} = 2$

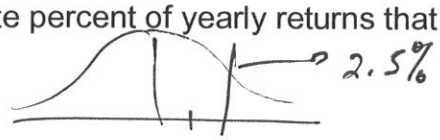
2 14. If a data set with seven thousand values has 2,200 ones, 1,500 twos, 200 threes, and 3,100 fours what is the numerical value of the median? Median is average of values in positions 3,500 and 3,501. $1, \ldots, 1_{2200}, 2_{2201}, \ldots 2_{3700}, 3_{3701}, \ldots$

25% 15. If a data set with unknown shape has a mean of 140 units and a standard deviation of 14 units then at most what percent of the data would be more than 168?

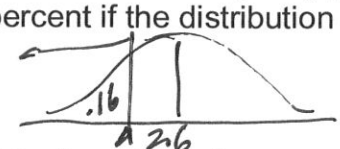


A very low risk stock has a steady rate of return without excess variance. Assume that the yearly percent return on a specific low risk stock has a mound-shaped distribution with a mean of 2.6 percent and a standard deviation of .35 percent. Use this information to answer the remainder of the questions on this page.

2.5% 16. Assuming the distribution of return on the stock is as described above what is the approximate percent of yearly returns that are more than 3.3 percent?

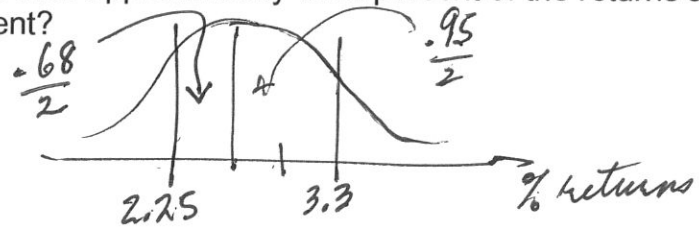


2.25 17. About 0.16 or 16% of the yearly percent returns on this specific low risk stock are less than what percent if the distribution for the returns is as described above?



$\bar{X} - S = 2.6 - .35 = 2.25$

81.5% 18. If the distribution of yearly percent returns on this specific low risk stock is as described above then approximately what percent of the returns are between 2.25 percent and 3.3 percent?



STATE THE ANSWER. State the answer on the line given. (3 points each)

1.5 19. The grade distribution of a certain physics test has a mean of 69 with a standard deviation of 9. What is the z-score associated with the exam grade of 82.5? State your answer with one digit past the decimal.

$$z = \frac{x - \bar{x}}{s} = \frac{82.5 - 69}{9} = 1.5$$

49.2 20. The grade distribution of a certain physics test has a mean of 69 with a standard deviation of 9. What is the value of a student's exam grade if the z-score associated with the grade is -2.2?

$$x = \bar{x} + zs = 69 + (-2.2)9 = 49.2$$

A random sample of eight rattlesnakes was chosen in Greer and Jackson Counties of Oklahoma. The length of each snake was measured in inches and is listed below. Use this sample of rattlesnake lengths to answer the remainder of the questions on this page.

45.6, 32.2, 53.8, 29.1, 24.9, 41.7, 35.6, 33.1

11,579.32 21. What is the numerical value of the sum of the squares for the above sample of rattlesnake lengths?

$$\Sigma x^2 = 45.6^2 + 32.2^2 + \ldots + 33.1^2 = 11,579.32$$

296 22. What is the numerical value of the sum for the above sample of rattlesnake lengths?

$$\Sigma x = 45.6 + 32.2 + \ldots + 33.1 = 296$$

37 23. What is the numerical value of the mean of the above sample of rattlesnake lengths?

$$\bar{x} = \frac{\Sigma x}{n} = \frac{296}{8} = 37$$

34.35 24. What is a numerical value for the median of the above sample of rattlesnake lengths?

24.9 29.1 32.2 33.1 35.6 41.7 45.6 53.8

average

89.6 25. What is the numerical value of the variance of the above sample of rattlesnake lengths? Round your answer to one digit past the decimal.

$$s^2 = \frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1} = \frac{11,579.32 - \frac{296^2}{8}}{7}$$

9.5 26. What is the numerical value of the standard deviation of the above sample of rattlesnake lengths? Round your answer to one digit past the decimal.

$$s = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1}} = \sqrt{89.6}$$

STATE THE ANSWER. State the answer on the line given. (3 points each)

.089 27. Suppose a library with 15,236 volumes, has 5,453 volumes of non-fiction, 8,425 volumes are fiction, 738 volumes are biographies and the rest are dictionaries. If you randomly pick up one volume from the library, what is the probability that you will get a biography or a dictionary? Round your answer to three digits past the decimal. $P(NF) = \frac{5453}{15,236}$, $P(F) = \frac{8425}{15,236}$ $P(Bio) = \frac{738}{15,236}$, $P(Dic) = \frac{620}{15,236}$

.6876 $P(Bio \cup Dic) = P(Bio) + P(Dic) - P(Bio \cap Dic) = \frac{738+620-0}{15,236}$. 28. Fifty-seven percent of all employees of Oklahoma State University include dependants on their health insurance. Of married employees, seventy-two percent include dependents on their health insurance. If forty-two percent of all OSU employees are married, then what is the percent of OSU employees who are married or include dependants on their health insurance? $.42 + .57 - .72(.42) = .6876$

$P(dep) = .57$, $P(dep/married) = .72$ $P(Married) = .42$

$P(Married \cup Dep) = P(Married) + P(Dep) - P(Married \cap Dep) =$

A research institute surveyed 300 people between age 20 and 30 in a certain city for their marital status. They obtained the information given in the table below. One of these 300 people is selected at random. **Do not reduce fractional answers. State all of your answers as ratio fractions. Do not state decimal fraction answers.**

	Married		Single		
	Male	**Female**	**Male**	**Female**	
Under Age 25	13	24	40	52	129
Age 25 or above	27	38	72	34	171
	40	62	112	86	300

129/300 29. What is the probably that the person selected is under age 25?

65/102 30. If the person selected is married, what is the probability that the person is above age 25?

86/148 31. If the person selected is female, what is the probability that the person is still single?

13/300 32. What is the probability that the selected person is a married male and under age 25?

52/86 33. Assume the person is selected from all single females, what is the probability that she will be under age 25?