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

EXAM ONE **SIGNATURE, IN INK**_____

FALL 2010 **CWID IN INK**_____

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. The number of homeruns in a baseball game is a qualitative variable.

F 2. If a data set with the values 234, 533, 194, 634, 324, 653, 432, 764, 265, and 594 was placed into a stem and leaf diagram where the stem units were 100, then the first stem would be 19.

T 3. If nothing is known about the shape of a data set then the percentage of data that is greater than the value that is two standard deviations above the mean is at most 25%.

T 4. The median of the data is the middle of the data set, but the mean of the data is the balance point of the data if the data were graphed as a dot diagram on a number line.

F 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. If two events, A and B, are independent, then the conditional probability of A given B is always equal to the probability of the event A.

For the remainder of the questions on this page use the data set:

25, 42, -34, 15, 22, and -18.

52 8. State the numerical value of the sum of the data set.

$\sum x = 25 + 42 + (-34) + 15 + 22 + (-18) = 52$

4,578 9. State the numerical value of the sum of squares of the data set.

$\sum x^2 = 25^2 + 42^2 + (-34)^2 + 15^2 + 22^2 + (-18)^2 = 4,578$

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

$$s = \sqrt{\frac{\sum x^2 - \frac{(\sum x)^2}{n}}{n-1}} = \sqrt{\frac{4,578 - \frac{52^2}{6}}{5}} = 28.73093571$$

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

96 11. If a segment of a pie chart is an arc of 72 degrees what is the frequency for the category of the variable represented by that segment of the pie chart if there are 480 observations in the data set? $\frac{X}{480} = \frac{72}{360} \Rightarrow X = 96$

400 12. How many observations are in a data set if a category with 20 observations has a relative frequency of 0.05?

$\frac{20}{X} = .05 \Rightarrow X = \frac{20}{.05} = 400$

11 13. If from a sample with 25 observations the sum of squares is 3,265 and the sum is 275 what is the numerical value of the sample mean?

$\bar{X} = \frac{\Sigma X}{n} = \frac{275}{25} = 11$

10 14. If from a sample with 25 observations the sum of squares is 3,265 and the sum is 275 what is the numerical value of the sample variance?

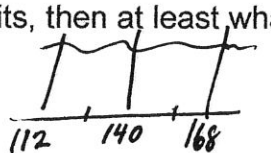
$s^2 = \frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1} = \frac{3,265 - \frac{275^2}{25}}{24} = 10$

2 15. If a data set with eight-thousand observations has 1,200 ones, 1,500 twos, 2,200 threes, and 3,100 fours what is the numerical value of the first quartile?

$1_1, \ldots, 1_{1,200}, 2_{1,201}, \ldots 2_{2,700}, \ldots 3_{2701}, \ldots 3_{4900}, \ldots, 4_{4901}, \ldots 4_{8,000}$.

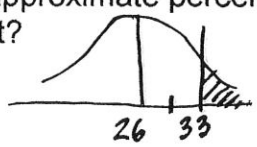
Q_1 has position 2000.5 so $Q_1 = 2$

75% 16. If a data set with unknown shape has a mean of 140 units and a standard deviation of 14 units, then at least what percent of the data would be between the values 112 and 168?



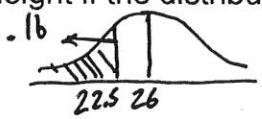
The Grandiflora magnolia trees on campus are about the same age so they do not have much variation in their heights. Assume that the height of magnolia trees on campus has mound-shaped distribution with a mean of 26 feet and a standard deviation of 3.5 feet. Use this information to answer the remainder of the questions on this page.

2.5% 17. Assuming the distribution of magnolia tree height is as described above what is the approximate percent of the magnolia trees on campus have heights greater than 33 feet?



33 has a z-score of 2 so 2.5% above

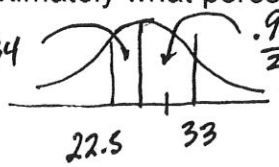
22.5 18. About 0.16 or 16% of the magnolia trees on campus are shorter than how many feet in height if the distribution is as described above?



16% are less than 1 st. dev. below the mean.

$X = \bar{X} + zs = 26 + (-1)3.5 = 22.5$

81.5% 19. If the distribution of magnolia tree height on campus is as described above then approximately what percent of the magnolia tree have heights between 22.5 feet and 33 feet?



$\frac{.95}{2} = .475$

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

-1.5 20. The grade distribution of the first test in a business statistics course has a mean of 73 with a standard deviation of 12. What is the z score associated with the exam grade of 55? State your answer with one digit past the decimal.

$$z_{x=55} = \frac{x-\bar{x}}{s} = \frac{55-73}{12} = \frac{-18}{12} = -1.5$$

79 21. The grade distribution of the first test in a business statistics course has a mean of 73 with a standard deviation of 12. What is the value of a student's exam grade if the z score associated with the grade is 0.5?

$$x_{z=.5} = \bar{x} + zs = 73 + .5(12) = 79$$

A random sample of eight rattlesnakes was chosen in Jackson, Greer and Harmon counties of extreme southwest 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.

62.6, 49.2, 44.8, 22.1, 49.9, 51.7, 34.2, 43.2

17,033.63 22. What is the numerical value of the sum of the squares for the above sample of rattlesnake lengths?

$$\Sigma x^2 = 62.6^2 + \ldots + 43.2^2 = 17,033.63$$

44.7 23. What is the numerical value of the mean of the above sample of rattlesnake lengths? Round your answer to one digit past the decimal.

$$\bar{x} = \frac{\Sigma x}{n} = \frac{357.7}{8} = 44.7125$$

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

22.1 34.2 43.2 44.8 49.2 49.9 51.7 62.9

$$\text{median} = \frac{44.8+49.2}{2} = 47$$

148.57 25. What is the numerical value of the variance of the above sample of rattlesnake lengths? Round your answer to two digits past the decimal.

$$s^2 = \frac{\Sigma x^2 - \frac{(\Sigma x)^2}{n}}{n-1} = \frac{17,033.63 - \frac{357.7^2}{8}}{7} = 148.567$$

12.2 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.

$$s = \sqrt{s^2} = \sqrt{148.5669643} = 12.18880488$$

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

.33 27. Forty percent of all students in a course do all the practice questions to study for an exam. Twenty-Five percent of all the students in a course do well on the exam. Eighty percent of the students who do all the practice questions to study for an exam do well on the exam. What percent of the students in the course do all the practice questions or do well on the exam? $P(\text{do all})=.40$, $P(\text{well})=.25$, $P(\text{do well}\mid\text{all})=.8$

$P(\text{all} \cup \text{do well}) = P(\text{all}) + P(\text{do well}) - P(\text{do well}\mid\text{all})P(\text{all}) = .4 + .25 - .8(.4)$

.0000042 28. Assume on a ten-question multiple-choice test with 5 choices on each question that a student guesses randomly at each of the answers. What is the probability that the student makes at least 90% on the exam? State your answer with 7 digits past the decimal. $P(100\%) + P(90\%) =$

$\left(\frac{1}{5}\right)^{10} + \left[\left(\frac{1}{5}\right)^{9}\left(\frac{4}{5}\right)^{1}\right]10 = 4.1984^{-06} = .0000041984$

Five-hundred Oklahoma State University students were questioned about their legacy status at the University, whether they receive tuition fee waiver, and their GPA. A student is a legacy if one of their parents graduated from OSU. The following table indicates the legacy status, whether they receive some tuition fee waiver, and whether the GPA is above or below 3.0. Use this table to answer the remaining questions on this page.

Do not reduce fractional answers.

	Student with GPA < 3.0 receives waiver		Student with GPA >= 3.0 receives waiver		
	Yes	**No**	**Yes**	**No**	
Legacy	20	80	65	15	180
Not a Legacy	10	110	150	50	320
	30	190	215	65	500

245/500 29. What is the probability of choosing a student who receives a tuition fee waiver? Do not reduce the fractional answer. $\frac{30+215}{500} = \frac{245}{500}$

85/245 30. If the one student chosen receives tuition fee waiver what is the probability that the student is a legacy? Do not reduce the fractional answer. $\frac{20+65}{30+215} = \frac{85}{245}$

160/320 31. Given that a student is not a legacy what is the probability that the student receives tuition fee waiver? Do not reduce the fractional answer. $\frac{10+150}{320} = \frac{160}{320}$

415/500 32. What is the probability that if one student is chosen that the student either does not receive a fee waiver or is not a legacy? Do not reduce the fraction. $P(\text{No waiver} \cup \text{not legacy}) = \frac{(190+65)+(320)-(110+50)}{500} = \frac{415}{500}$

340/500 33. What is the probability that if one student is chosen that the student is a legacy or receives a tuition fee waiver? Do not reduce the fractional answer. $P(\text{legacy} \cup \text{receives waiver}) = \frac{180+(30+215)-(20+65)}{500} = \frac{340}{500}$