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

EXAM ONE **SIGNATURE, IN INK**_____

FALL 2012 **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 injuries in a football 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.

F 4. The mode of the data set is the total frequency of the data set divided by the range of the data.

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.

For the reminder of the questions on this page use the data set: 25, 42, 34, 15, 22.

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.

$$S = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}} = \sqrt{\frac{4254 - \frac{138^2}{5}}{4}} = 10.549$$

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

.15 10. If a segment of a pie chart is an arc of 54 degrees what is the relative frequency for the category of the variable represented by that segment of the pie chart?

$54/360 = .15$

440 11. How many observations are in a data set if a category with 66 observations has a relative frequency of 0.15?

$.15(n) = 66 \Rightarrow \frac{66}{.15} = n = 440$

5 12. If from a data set with 168 observations the sum of squares is 4,868 and the sum is 840 what is the numerical value of the sample mean?

$\bar{X} = \frac{\Sigma X}{n} = \frac{840}{168} = 5$

2 13. If from a data set with 168 observations the sum of squares is 4,868 and the sum is 840 what is the numerical value of the sample standard deviation?

$S = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma X)^2}{n}}{n-1}} = \sqrt{\frac{4868 - \frac{840^2}{168}}{167}} = \sqrt{4} = 2$

4 14. If a data set with six thousand observations has 1,200 ones, 1,500 twos, 200 threes, and 3,100 fours what is the numerical value of the median?

$1_1, \ldots 1_{1200}, 2_{1201}, \ldots, 2_{2700}, 3_{2701}, \ldots, 3_{2900}, 4_{2901}, \ldots, 4_{6000}$

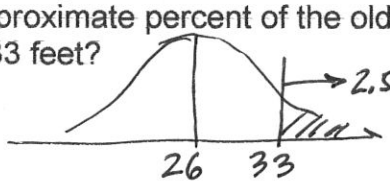
75% 15. If a data set with unknown shape has a mean of 140 units and a standard deviation of 14 units then at least what percent of the data would be between the values 112 and 168?

$z_{112} = \frac{112-140}{14} = -2$ $\quad (112, 168)$ is $\bar{X} \pm 2S$

$z_{168} = \frac{168-140}{14} = 2$

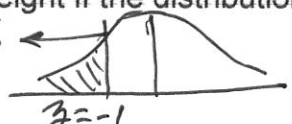
Magnolia trees on campus that were planted in the 1940's do not have much variation in their heights. Assume that the height of these older magnolia trees on campus has a mound-shaped distribution with a mean of 26 feet and a standard deviation of 3.5 feet. Use this information to answer the remainder of the questions on this page.

.025 OR 2.5% 16. Assuming the distribution of older magnolia tree height is as described above, what is the approximate percent of the older magnolia trees on campus have heights greater than 33 feet?



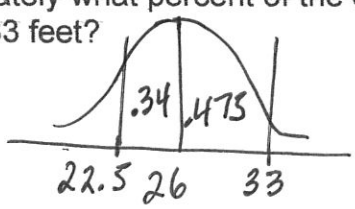
$z_{33} = \frac{X - \bar{X}}{s} = \frac{33-26}{3.5} = 2$

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



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

.815 OR 81.5 18. If the distribution of older magnolia tree height on campus is as described above then approximately what percent of the older magnolia trees have heights between 22.5 feet and 33 feet?



$(22.5, 33)$
$(-1, 2)$
$.34 + .475 = .815$

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

-1.5 19. 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.

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

79 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 value of a student's exam grade if the z score associated with the grade is 0.5?

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

A random sample of eight daily stock changes was drawn and the stock changes in percent are listed below. Use this sample to answer the remainder of the questions on this page.

-2.6, 9.2, -4.8, 2.1, 9.9, -1.7, 4.2, 3.2

247.63 21. What is the numerical value of the sum of the squares for the above sample of daily stock changes?

$$\Sigma x^2 = x_1^2 + \ldots + x_n^2 = (-2.6)^2 + 9.2^2 + \ldots + 3.2^2 = 247.63$$

19.5 22. What is the numerical value of the sum for the above sample of daily stock changes?

$$\Sigma x = x_1 + \ldots + x_n = (-2.6) + 9.2 + \ldots + 3.2 = 19.5$$

2.4 23. What is the numerical value of the mean of the above sample of daily stock changes? Round your answer to one digit past the decimal.

$$\bar{x} = \frac{\Sigma x}{n} = \frac{19.5}{8} = 2.4375 \Rightarrow 2.4$$

2.65 24. What is a numerical value for the median of the above sample of daily stock changes?

$-4.8 \quad -2.6 \quad -1.7 \quad 2.1 \quad 3.2 \quad 4.2 \quad 9.2 \quad 9.9$

median is average of 4th & 5th, $\frac{2.1+3.2}{2}$

28.59 25. What is the numerical value of the variance of the above sample of daily stock changes? Round your answer to two digits past the decimal.

$$s = \frac{\sum x^2 - \frac{(\Sigma x)^2}{n}}{n-1} = \frac{247.63 - \frac{19.5^2}{8}}{7} = 28.5855 \Rightarrow 28.59$$

5.3 26. What is the numerical value of the standard deviation of the above sample of daily stock changes? Round your answer to one digit past the decimal.

$$s = \sqrt{\frac{\sum x^2 - \frac{(\Sigma x)^2}{n}}{n-1}} = \sqrt{\frac{247.63 - \frac{19.5^2}{8}}{7}} = \sqrt{28.5855} = 5.3$$

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

.48 27. Sixty percent of all students in a course do all the practice questions to study for the test. Eighty percent of the students who do all the practice questions to study for the test do well on the test. What percent of the students in the course do all the practice questions and do well on the test?

$P(\text{Do all Q}) = .60$, $P(\text{well} \mid \text{Do all Q}) = .8$

.76 $P(\text{Do all Q} \cap \text{well}) = P(\text{well} \mid \text{Do all Q}) \cdot P(\text{Do all Q}) = .8(.6) = .48$ 28. Ninety percent of the tenured faculty members at a university have a PhD degree. If sixty percent of all the faculty members are tenured and seventy percent of all faculty members have a PhD degree, what is the percent of faculty members who are either tenured or hold the PhD degree? $P(\text{PhD} \mid \text{Tenured}) = .9$, $P(\text{Tenure}) = .6$

$P(\text{PhD}) = .7$, $P(\text{Tenured} \cup \text{PhD}) = P(\text{Tenure}) + P(\text{PhD}) - P(\text{PhD} \mid \text{Tenure}) \cdot P(\text{Tenure}) =$

Five hundred Oklahoma State University students were questioned about their legacy status at the University. A student is a legacy if one of their parents graduated from OSU. The following table indicates the legacy status of the students and whether or not they receive some tuition fee waiver. Use this table to answer the remainder of the questions on this page.

Do not reduce fractional answers.

	Student receives some fee waiver		
	Yes	**No**	
Legacy	188	24	212
Not a Legacy	56	232	288
	244	256	500

244/500 29. What is the probability of choosing a student who receives a tuition fee waiver? Do not reduce the fractional answer.

188 $P(\text{Receives tuition fee waiver}) = \frac{244}{500}$

244 30. If the one student chosen receives a tuition fee waiver, what is the probability that the student is a legacy? Do not reduce the fractional answer.

56 $P(\text{legacy} \mid \text{receives waiver}) = \frac{188}{244}$

288 31. Given that a student is not a legacy, what is the probability that the student receives a tuition fee waiver? Do not reduce the fractional answer.

312 $P(\text{receives waiver} \mid \text{Not a legacy}) = \frac{56}{288}$

500 32. What is the probability that if one student is chosen that the student either does not receive a tuition fee waiver or is not a legacy? Do not reduce the fraction.

188 $P(\text{No Waiver} \cup \text{No legacy}) = \frac{256}{500} + \frac{288}{500} - \frac{232}{500} = \frac{312}{500}$

500 33. What is the probability that if one student is chosen that the student is a legacy and receives a tuition fee waiver? Do not reduce the fractional answer.

$P(\text{legacy} \cap \text{receives waiver}) = \frac{188}{500}$