STATISTICS 2023 **NAME IN PRINT** Key

EXAM ONE **SIGNATURE IN INK** _____

FALL 2009 **CWID IN INK** _____

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

T 1. A frequency bar graph and a relative frequency bar graph both generated from the same data would be the same graph, but with different labeling on the vertical axis.

F 2. If the mean of a data set is greater than the median of the data set, then the data set is probably left skewed.

F 3. If the range in a mound-shaped data set is 660 units, then it is reasonable that the standard deviation is 220 units.

F 4. The numerical measures of central tendency include mean, mode, median, and range.

F 5. If a data set is mound shaped then approximately 95% of the data set is within one standard deviation of the mean.

T 6. If a data set with unknown shape has a mean of 43 and a standard deviation 7 then at most 25% of the data are outside of the interval (29, 57).

T 7. The complement of an event is the set of outcomes not included in the event.

CALCULATION QUESTIONS. Write the answer on the line. **(3 points each)**
Assume that a sample had 7 observations that are the values: 7, 3, 4, 11, 3, 14, 10.

52 8. What is the numerical value of the sum of the observations?

$$\Sigma x = x_1 + x_2 + \ldots + x_n = 7 + 3 + \ldots + 10 = 52$$

500 9. What is the numerical value of the sum of the squares of the observations?

$$\Sigma x^2 = x_1^2 + x_2^2 + \ldots + x_n^2 = 7^2 + 3^2 + \ldots + 10^2 = 500$$

2,704 10. What is the numerical value of the square of the sum of the observations?

$$(\Sigma x)^2 = (x_1 + x_2 + \ldots + x_n)^2 = (7 + 3 + \ldots + 10)^2 = 52^2$$

18.95 11. What is the numerical value of the variance of the sample listed above? Round your answer to two digits past the decimal.

$$s^2 = \frac{\sum x^2 - \frac{(\Sigma x)^2}{n}}{n-1} = \frac{500 - \frac{52^2}{7}}{6} = 18.95$$

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

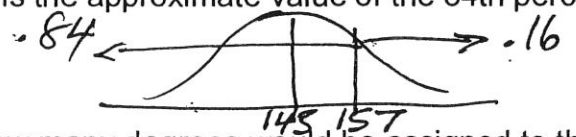
22 12. If the sum of the values in a sample with 260 observations is 5,720 then what is the numerical value of the sample mean?

$$\bar{X} = \frac{\Sigma X}{n} = \frac{5,720}{260} = 22$$

7 13. If the sum of squares in a sample with 260 observations is 138,531 and the sum is 5,720 then what is the numerical value of the sample standard deviation?

$$S = \sqrt{\frac{\Sigma x^2 - \frac{(\Sigma X)^2}{n}}{n-1}} = \sqrt{\frac{138,531 - \frac{5,720^2}{260}}{259}} = \sqrt{49}$$

157 14. If a data set is mound-shaped with a mean of 145 and a standard deviation of 12, then what is the approximate value of the 84th percentile?



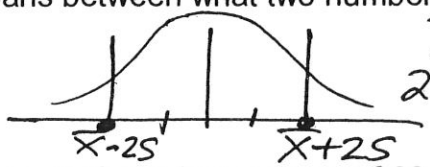
72 15. How many degrees would be assigned to the segment of a pie chart that represents a category in the data which has a relative frequency of 0.20?

$$\text{degrees} = \text{relfreq}(360) = .2(360) = 72$$

.8 16. If a data set has a mean of 54 and a standard deviation of 18 then what is the z score for the value 68.4?

$$z = \frac{x - \bar{x}}{s} = \frac{68.4 - 54}{18} = .8$$

(24.6, 27.8) 17. A sample of 16 red tail hawks had an average wingspan of 26.2 inches and a standard deviation of 0.8. Based on this sample, about 95% of all red tail hawks should have wingspans between what two numbers, if wingspan is assumed to have a mound shape?

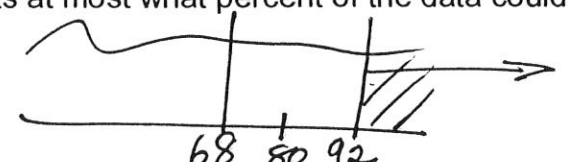


$\bar{X} \pm 2S$

$26.2 \pm 2(.8)$

$(24.6, 27.8)$

25% 18. If a data set with unknown shape has a mean of 68 and a standard deviation of 12 units at most what percent of the data could be greater than the value 92?



at most 25%

3 19. A data set with 1,000 values contains 150 ones, 250 twos, 400 threes, and 200 fours. What is the numerical value of the median for this data set?

$1_1, \ldots, 1_{150}, 2_{151}, \ldots 2_{400}, 3_{401}, \ldots, 3_{800}, 4_{801}, \ldots 4_{1000}$

position of $\frac{n+1}{2} = \frac{1000+1}{2} = 500.5$.

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

The Oklahoma State University Water Ski Team recorded the time in seconds required by the 7 members of the team to perform a difficult water ski event. The time in seconds required by each student to perform the water ski event are as follows:
38, 29, 42, 62, 28, 26, 44
Use this sample data to answer the next four questions.

38.43 20. What is the numerical value of the mean for this sample of water ski event times? Round your answer to two digits past the decimal.

$\bar{X} = \frac{\Sigma X}{n} = \frac{269}{7} = 38.42857$

12.59 21. What is the numerical value of the standard deviation for the time required for members of the water ski team to perform this difficult event? Round your answer to two digits past the decimal.

$S = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}} = \sqrt{\frac{11,289 - \frac{269^2}{7}}{6}} = \sqrt{158.619}$

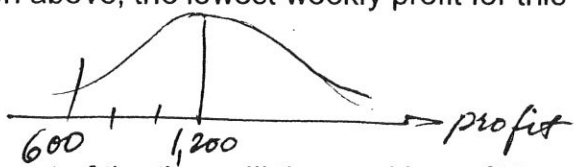
38 22. What is the numerical value of the median of the above sample of times required to perform this difficult water ski event?

26 28 29 (38) 42 44 62

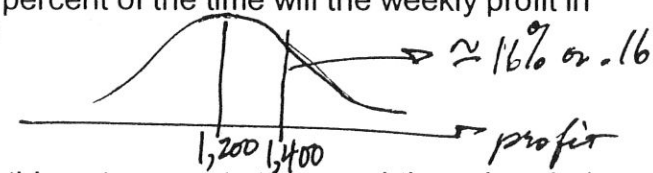
$\frac{3}{7}$ 23. What fraction of the members on the water ski team can perform this difficult water ski event in less than half a minute? $\frac{3}{7}$

The weekly profit in a small clothing store in Ardmore, Oklahoma is mound shaped with a mean of $1,200 and a standard deviation of $200. Use this information to answer the remaining questions on this page.

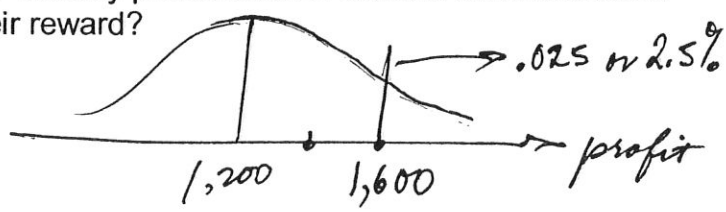
$600 24. Based on the information above, the lowest weekly profit for this clothing store is approximately what value?



16% 25. Approximately what percent of the time will the weekly profit in this clothing store exceed the value $1,400?



$1,600 26. The owner of this clothing store wants to reward the sales clerks 2.5% of the time when profit is highest. Weekly profit needs to exceed what amount in order for the sales clerks to receive their reward?



PROBABILITY QUESTIONS. State the answer on the line. (3 points each)

0.0976 27. You have two internet service providers connected to your home computer that function independently. One provider has a failure rate of 0.04 and the other provider has a failure rate of 0.06, what is the probability that at least one of the internet service providers will fail? Do not round your answer. $P(F_1)=.04$, $P(F_2)=.06$

$P(F_1 \cup F_2) = P(F_1)+P(F_2)-P(F_1 \cap F_2) = .04+.06-.04(.06)$

0.54 28. Oklahoma State University sells only to students a special sports package that contains tickets for three specific home football games. Sixty percent of all students purchase this special sports package. Forty-five percent of all students attend these three home football games. Given that a student does purchase this special sports package, the probability that the student will attend these three football games is 0.85. What is the probability that a student will purchase the special sports package or will attend these three football games? Do not round your answer. $P(pkg)=.60$, $P(att)=.45$

$P(att \mid pkg)=.85$, $P(pkg \cup att)=P(pkg)+P(att)-P(pkg \cap att)=.6+.45-.85(.6)$

Four-hundred fifty students were questioned about whether they thought that the paper version of the O'Collegian should continue to be printed. The students were also asked if they typically read the on-line version of the O'Collegian newspaper and their age. The data resulted in the following table. Use it to answer the remaining questions on this page. Answer with a fraction, do not simplify, and do not state the answer as a decimal.

	In favor of continuing to print the O'Collegian on Paper?			
	Yes, continue to print on paper		No, do not continue to print on paper	
	Less than 21	21 or older	Less than 21	21 or older
Reads O'Collegian on-line	38	35	118	68
Does not read O'Collegian on-line	42	78	41	30

$\frac{193}{450}$ 29. What is the probability that a randomly chosen student is in favor of continuing to print the O'Collegian on paper?

$\frac{301}{450}$ 30. What is the probability that a randomly chosen student is in favor of continuing to print the O'Collegian to paper and is less than 21 years of age or reads the O'Collegian on-line?

$\frac{186}{257}$ 31. Given that a student does not think that the university should continue to print the O'Collegian on paper, what is the probability that the student reads the O'Collegian on-line?

$\frac{120}{193}$ 32. Assuming that a student is in favor of continuing to print the O'Collegian on paper, what is the probability that the student does not read the O'Collegian on-line?

$\frac{73}{450}$ 33. What is the probability that a randomly chosen student favors continuing to print the O'Collegian on paper and reads the O'Collegian on-line?