STATISTICS 2023　　　　　　　　NAME IN PRINT_____2E1F97V1. WRD_____

EXAM ONE　　　　　　　　　　SIGNATURE IN INK_____

FALL 1997　　　　　　　　　　ID OR SS 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 data set is 625 units then it is reasonable that the standard deviation is 25 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 data set had 7 observations which had the values:　 7, 3, 4, 11, 3, 14, 10.

___52___ 8. What is the numerical value of the sum of the observations?

___500___ 9. What is the numerical value of the sum of the squares of the observations?

___2,704___ 10. What is the numerical value of the square of the sum of the observations?

___7.43___ 11. What is the numerical value of the mean of the data set listed above?

$$\overline{X} = 7.428571429.\ \text{Round to 2.}$$

**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?

$$S = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}} = \sqrt{\frac{138,531 - \frac{(5,720)^2}{260}}{259}} = \sqrt{49} = 7$$

_____ **100** _____ 14. If a data set is mound shaped with a mean of 100 and a standard deviation of 10 then half of the data is greater than what value?

⟶ , 50

100
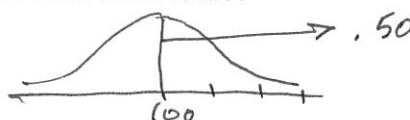
_____ **72** _____ 15. How many degrees would be assigned to the segment of a pie chart that represents a category in the data which has a relative frequency of 0.20?

degree for segment = Rel. Freq (360) = 72

_____ **1.25** _____ 16. If a data set has a mean of 54 and a standard deviation of 12 then what is the z score for the value 69?

$$z = \frac{X - \bar{X}}{S} = \frac{69 - 54}{12} = \frac{15}{12} = 1.25$$

_____ **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?

$$\bar{X} \pm 2S \Rightarrow 26.2 \pm 2(0.8)$$
$$\Rightarrow 26.2 \pm 1.6 \Rightarrow (24.6, 27.8)$$

_____ **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?

≤ 25%

68 80 92
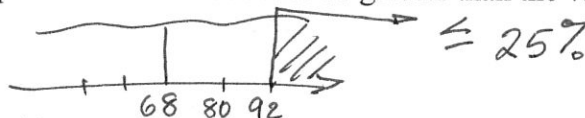
_____ **3** _____ 19. A data set with 1,000 values contains 150 ones, 250 twos, 400 threes and 200 fours. What is the numerical value of the median for this data set?

The Oklahoma State University Water Ski Team recorded the time in seconds required by 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 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?

$$\overline{X} = 38.42857143 \qquad Round\ to\ 2.$$

_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.

$$S = 12.59440541$$

_38_   22. What is the numerical value of the median of the above sample of times required to perform this difficult water ski event?

$$26,\quad 28,\quad 29,\quad \underline{38},\quad 42,\quad 44,\quad 62$$

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

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?
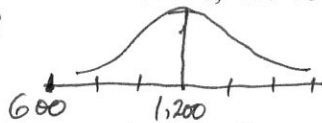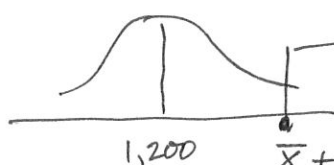
$$Lowest = \overline{X} - 3S = 1,200 - 3(200) = 600$$

_16%_   25. Approximately what percent of the time will the weekly profit in this clothing store exceed the value $1,400?
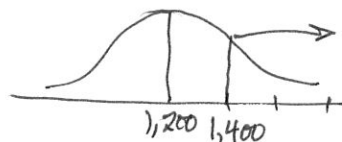
$$\frac{.32}{2} = 16\%$$

_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 sales need to exceed what amount in order for the sales clerks to receive their reward?

$$2.5\% = \frac{.05}{2}$$

$$\overline{X} + 2S = 1,200 + 2(200) = 1,600$$

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

_.0024_   27. If you have two internet service providers connected to your home computer that function independently and 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 both internet service providers will fail at the same time? Do not round your answer. $P(F_1) = .04$, $P(F_2) = .06$

$$P(F_1 \cap F_2) = P(F_1) \cdot P(F_2) = .04(.06) = .0024$$

_0.51_   28. Oklahoma State University sells only to students a special sports package that contains tickets for three home football games. Only 60% of all students purchase the sports package. Given that a student does purchase the sports package the probability that the student will use all three of the football tickets is 0.85. What is the probability that a student will purchase the sports package and will use all three of the football tickets? Do not round your answer.

$P(SP) = .60$, $P(3\,games\,/\,SP) = .85$

$$P(SP \cap 3\,games) = P(3\,games\,/\,SP) \cdot P(SP) = .85(.60) = 0.51$$

Five hundred students were questioned about whether they thought Gallagher-Iba Arena, the famous basketball gymnasium at Oklahoma State University, should be renovated to have more seating space. The students were also asked if they had attended a sports event in Gallagher-Iba last semester or not. 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 a decimal.

	In favor of Gallagher-Iba Renovation?		
Attended a sports Event last semester in Gallagher-Iba Arena?	YES	NO	
YES	130	110	240
NO	190	70	260
	320	180	500

$\dfrac{320}{500}$ 29. What is the probability that a randomly chosen student is in favor of the renovation of Gallagher-Iba Arena?

$\dfrac{130}{500}$ 30. What is the probability that a randomly chosen student is in favor of the renovation and did attend a sports event in Gallagher-Iba Arena last semester?

$\dfrac{130}{240}$ 31. Given that a student did attend a sports event in Gallagher-Iba Arena last semester what is the probability that the student is in favor of the renovation?

$\dfrac{190}{320}$ 32. What is the probability that a student who is in favor of the renovation did not attended a sports event at Gallagher-Iba Arena last semester?

$\dfrac{430}{500}$ 33. What is the probability that a randomly chosen student either favors the renovation or attended a sports event in Gallagher-Iba Arena last semester?

$$P(FAVORS \cup Attended) = \frac{320 + 240 - 130}{500}$$