STATISTICS 2023 **NAME IN PRINT** Key

EXAM ONE **SIGNATURE IN INK** _____

SPRING 2015 **CWID IN INK** _____

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

T 1. A relative frequency bar graph indicates frequency with height, not width or area, whereas, a pie chart indicates relative frequency with area, not height.

F 2. If the mean, median, and mode of a data set are all equal, then the data set is left skewed.

F 3. The weight of a dog pack with 6 big dogs, who each weigh between 50 and 80 pounds, has a higher mean and a higher variance than the weight of a dog pack with three big 60-pound dogs and three Chihuahuas, who each weigh less than ten pounds.

T 4. The variance of a sample of data measures the spread of the data about the sample mean in squared units.

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

F 6. The probability of an event is the likelihood of the event stated as a number between one and zero, but cannot be equal to one or zero.

T 7. The z-value of +1 represents approximate the 84th percentile in the mound-shaped distribution.

CALCULATION QUESTIONS. Write the answer on the line. **(3 points each)**
In the social-networking app, Yik Yak, each comment has a rating. The ratings on 8 randomly selected comments are listed below.

4, 11, -3, 0, -1, 16, 5, 8

40 8. What is the sum of the ratings on the Yik Yak comments?

$\Sigma x = 4 + 11 + \ldots + 8 = 40$

492 9. What is the sum of the squares of the ratings on the Yik Yak comments?

$\Sigma x^2 = 4^2 + 11^2 + \ldots + 8^2 = 492$

5 10. What is the sample mean associated with the ratings on the Yik Yak comments?

$\bar{x} = \frac{\Sigma x}{n} = \frac{40}{8} = 5$

1,600 11. What is the square of the sum of the ratings on the Yik Yak comments?

$(\Sigma x)^2 = (40)^2 = 1600$

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

2 12. If the sum of squares in a sample with 260 observations is 138,531 and the sum is 520, then what is the numerical value of the sample mean?

$\bar{X} = \frac{\Sigma X}{n} = \frac{520}{260} = 2$

23.04 13. If the sum of squares in a sample with 260 observations is 138,531 and the sum is 520, then what is the numerical value of the sample standard deviation? Round your answer to two digits past the decimal.

$S = \sqrt{\frac{\Sigma X^2 - \frac{(\Sigma X)^2}{n}}{n-1}} = \sqrt{\frac{138{,}531 - \frac{520^2}{260}}{259}} = 23.04$

10 14. If a data set with one-thousand observations is comprised of six-hundred 10's, three-hundred 20's, and one-hundred 30's, what is the value of the median? median is at 500.5

$10_1, \ldots, 10_{600}, 20_{601}, \ldots, 20_{900}, 30_{901}, \ldots 30_{1000}$

Japanese green tea is a high quality tea available for purchase at many websites. Eight varieties of Japanese green tea are available from UptonTea.com. The price for 15grams on each of the 8 varieties are listed below. Use these data to answer the problems on this page.

$5.30	$4.50	$1.50	$4.40	$2.50	$2.14	$1.50	$6.00

3.48 15. What is the mean Japanese green tea price for a 15gram sample of these eight varieties of tea? Round your answer to two digits past the decimal.

$\bar{X} = \frac{\Sigma X}{n} = \frac{27.84}{8} = 3.48$

3.45 16. What is the value of the median of the Japanese green tea price for a 15gram sample of these eight varieties?

1.50 1.50 2.14 2.50 4.40 4.50 5.30 6.00

average $= \frac{2.50 + 4.40}{2} = 3.45$

1.50 17. What is the value of the mode of the Japanese green tea price for a 15gram sample of these eight varieties?

The value of $1.50 has frequency 2.

1.78 18. What is the value of the standard deviation associated with the Japanese green tea price for a 15gram sample of these eight varieties? Round your answer to two digits past the decimal.

$S = \sqrt{\frac{119.0296 - \frac{27.84^2}{8}}{7}} = 1.778699364$

7.04 19. If nothing is known about the shape of the distribution of the variable Japanese green tea price for a 15gram sample of these eight varieties, then at most twenty-five percent of the prices are more than what value?

$\bar{X} + 2S = 3.48 + 2(1.78) = 7.04$

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

The close values on the stock for a large Oklahoma company over the last year were analyzed. The resulting mean close value of the stock was 68.4, with a standard deviation of 2.6. Use this information to answer the questions on this page.

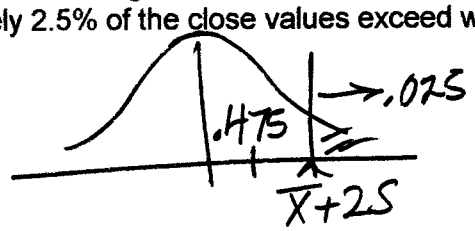
$\bar{X} = 68.4, \quad S = 2.6$

63.2, 73.6 20. What is the interval that describes the set of close values for the stock that are within two standard deviations of the mean?

$\bar{X} \pm 2S \Rightarrow 68.4 \pm 2(2.6) \Rightarrow 68.4 \pm 5.2 \Rightarrow$

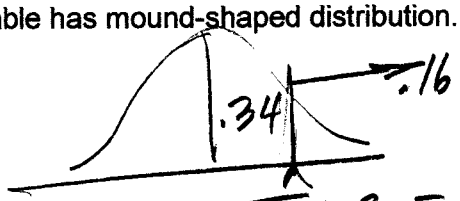
$(63.2, 73.6)$

73.6 21. Assuming that the close values for the stock has a mound-shaped distribution, then only approximately 2.5% of the close values exceed what value?



$\bar{X}+2S = 73.6$

71 22. State the value of the 84th percentile for the variable close values for the stock, assuming that the variable has mound-shaped distribution.

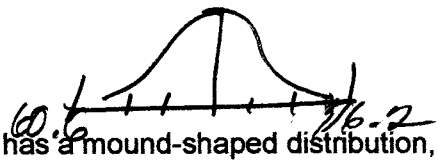


$\bar{X}+S = 68.4+2.6 = 71$

60.6, 76.2 23. Assuming that the close values for the stock has a mound-shaped distribution, then one could conclude that approximately 100% of the close values for the stock are between what two values?

$\bar{X} \pm 3S \Rightarrow 68.4 \pm 3(2.6) \Rightarrow 68.4 \pm 7.8$

$\Rightarrow (60.6, 76.2)$



60.6 24 Assuming that the close values for the stock has a mound-shaped distribution, then what is the approximate minimum close value?

$\bar{X} - 3S = 60.6$

−2.2 25. What is the z-score associated with the stock close value of 62.68?

$z_{62.68} = \frac{X - \bar{X}}{S} = \frac{62.68 - 68.4}{2.6} = -2.2$

74.05 26. What is the close values for the stock if it is associated with a z-score of 2.25? State your answer with two digits past the decimal.

$X_{2.25} = \bar{X} + zS = 68.2 + (2.25)\,2.6 = 74.05$

Notice this should be 68.4 + (2.25) 2.6 = 74.25, not 74.05.

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

.0392 27. Assume you manage a café in downtown Stillwater. You have two reliable bartenders who each have only a 0.02 chance of missing any assigned shift. But, if one bartender misses the assigned shift, the probability of the other one also missing the assigned shift is 0.04. What is the probability that either one or both of the bartenders will miss their assigned shifts?

$P(B_1 \cup B_2) = P(B_1) + P(B_2) - P(B_1 \cap B_2)$

$= P(B_1) + P(B_2) - P(B_1 | B_2) \cdot P(B_2)$

$= .02 + .02 - .04(.02) = .0392$

0.126 28. The probability of your truck having a flat is 0.05 and the probability of a dead battery is 0.08. Since the battery and the tires on your truck function independently, what is the probability of a dead battery or a flat tire on your truck?

$P(\text{flat}) = .05)\ P(\text{dead battery}) = .08$

$P(\text{dead} \cup \text{flat}) = P(\text{dead}) + P(\text{flat}) - P(\text{dead} \cap \text{flat})$

$= .08 + .05 - (.05)(.08) = 0.126$

A current initiative at Oklahoma State University, called Finish-In-Four, is focused on encouraging undergraduates to complete their bachelor's degree within four years. Five-hundred OSU undergraduates were questioned about whether they had heard about Finish-In-Four and also about whether they had a plan to complete their bachelor's degree in four years. Use the data below to answer the questions on this page. Do not reduce the fractional answers. Do not state decimal values.

		Has a plan to complete the bachelor's degree in four years.		
		YES	NO	
Has heard of the Finish-In Four Initiative	YES	210	55	265
	NO	85	150	235
		295	205	500

265/500 29. What is the probability that a randomly chosen student has heard about Finish-In-Four?

210/500 30. What is the probability that a randomly chosen student has heard about Finish-In-Four and has a plan to finish their bachelor's degree in four years?

210/265 31. Given that a student has heard about Finish-In-Four, what is the probability that they have a plan to complete their bachelor's degree in four years?

350/500 32. What is the probability that a student has either heard about Finish-In-Four or has a plan to complete their bachelor's degree in four years?

$\frac{265 + 295 - 210}{500} = \frac{350}{500}$

85/235 33. If a student has not heard about Finish-In-Four, what is the probability that the student has a plan to complete their bachelor's degree within four years?