

Day 8 Unit 1 review

1. A set of data has a mean of 78 and a standard deviation of 9. What is the z-score for a value of 55?

$$z = \frac{55 - 78}{9} \approx -2.56$$

2. If a set of normally distributed data with a mean of 85 and a standard deviation of 10.6. What values are 2 standard deviations from the mean?

$$63.8 \quad + \quad 106.2$$

3. An 8 oz. container of blue berries has a mean of 93 berries and a standard deviation of 4 berries. What percent of containers have 85 to 101 berries?

$$95.45\%$$

4. The scores on a test have a mean of 79 and a standard deviation of 6. What percent of scores greater than 91?

$$2.28\%$$

5. A basketball has a probability of 5/10 for 2 point shots, 4/10 for 3 point shots, and 8/10 for free throws. What is his expected value for the next game?

$$2\left(\frac{5}{10}\right) + 3\left(\frac{4}{10}\right) + \left(\frac{1}{10}\right) = \boxed{2.3 \text{ points}}$$

1/10?

3 points

6. What is the sample size needed to obtain a margin of error of $\pm 3.5\%$?

$$\left(\frac{1}{.035}\right)^2 = \boxed{817}$$

7. What is the margin of error for a sample size of 1400?

$$\frac{1}{\sqrt{1400}} \approx \boxed{\pm .027}$$

8. A data set has a mean of 51 and standard deviation of 5. What value would have a z-score of 3.19?

$$3.19 = \frac{x - 51}{5}$$

$$\boxed{x = 66.95}$$

9. What sample size is needed to obtain margin of error of $\pm 4.3\%$?

$$\left(\frac{1}{.043}\right)^2 = 540.83 = \boxed{541}$$

10. The owner of a hair salon wants to determine how clients rate the customer service of his staff. To do this he leaves a stack of response cards at the reception desk. What type of sampling does this represent?

Voluntary

11. What is the probability of scoring above 1500 on an SAT with a mean of 1400 and a standard deviation of 150 given the results are normally distributed.

$$.2525 \text{ OR } \boxed{25.25\%}$$

12. The average height of women is 5' 5" with a standard deviation of 2.5 inches. 80% of women are above what height?



13. Using the data from problem 12, what is height of the 60th percentile for women?

$$\text{invNorm}(.6, 65, 2.5) = \boxed{65.63 \text{ in}} \text{ OR } \approx 5'6''$$

14. A group of students is interested in knowing if the number of times they can sink a basketball is related to the color of the basketball. The students shoot a series of baskets and record their success using a regulation colored basketball. They then switch to a blue colored basketball and shoot the same series of baskets. What type of study is this?

experiment

15. A group of students is interested in knowing if there is a correlation between attending an SAT Prep class and scores achieved on the SAT Examination. The students use a survey to collect their data from both students who took an SAT Prep class and those that did not take an SAT Prep class. What type of study is this?

observation (survey)

16. A local talk radio show asked listeners to call in to express their opinion on whether or not Global warming is a result of human activity or just part of a natural cycle. What type of sample is this?

voluntary

17. A survey of 1000 US adults found that 9% exercise more than 3 hours per week. What interval is likely for the population of the US?

$$\frac{1}{\sqrt{1000}} = \pm 3.16\%$$

$$5.84 - 12.16 \text{ OR } [5.84, 12.16]$$

18. If your sample size is 800 and you wish to cut your margin of error in half, what will be your new sample size?

$$800 \cdot 4 = \boxed{3,200}$$

19. What sample size is needed to have a margin of error of $\pm 2.8\%$?

$$\left(\frac{1}{.028}\right)^2 = \boxed{1,276}$$

20. A university polled 500 students randomly selecting them proportional to the number of students enrolled in each degree program. What type of sampling is this?

stratified

21. An easily accessible sample is chosen. What type of sample is this?

convenience

22. A survey question asks, do you prefer news or mindless sitcoms? Is this question biased? If so what kind of bias is it?

question bias \rightarrow mindless has negative connotation

23. Suppose the officer grabs a random sample but only does so of the freshman students. What type of bias does this study suffer from?

undercoverage

24. The fee for a card game is \$1. The game plays as follows; a card is drawn from a deck of 52 cards. If a red face card is drawn then \$5.00 is won. If a black card under 7 (2, 3, 4, 5, 6) is drawn then \$3.00 is won. Any other draw wins nothing. What is the expected value of this game?

$$4\left(\frac{6}{52}\right) + 2\left(\frac{10}{52}\right) + -1\left(\frac{36}{52}\right) = \boxed{\$0.15} \text{ gain}$$

25. The fee for a card game is \$1. The game plays as follows; a card is drawn from a deck of cards. If an even spade is drawn (2, 4, 6, 8, 10) \$5.00 is won. If the ace of hearts is drawn then \$20.00 is won. Any other draw wins nothing. What is the expected value of this game?

$$4\left(\frac{5}{52}\right) + 19\left(\frac{1}{52}\right) + -1\left(\frac{46}{52}\right) = \boxed{-\$0.13} \text{ loss}$$

26. In a population of scores a raw score with the value of 83 corresponds to a Z of +1.00 and a raw score of 86 corresponds to a Z of +2.00. What is the mean and standard deviation of this population?

*System

$$2 = \frac{86-x}{83-x} \quad 166-2x=86-x \quad 1 = \frac{83-x}{y} \quad 2 = \frac{86-x}{y} \quad \boxed{\mu=80, \sigma=3}$$

$$80 = x \quad y = 83-x$$

27. On a statistics exam, you have a score of 73. If the mean of the exam is 65 would you prefer the standard deviation of the scores to be 8 or 16? Why?

8, because \div by less gives me a higher z-score.

28. A survey is conducted to determine if more funds should be spent on athletic programs or on the school theater program. Students attending the basketball game are surveyed. What type of bias could occur in this study?

undercoverage

29. The critical reading part of the SAT has a mean of 496 and a standard deviation of 114. The math part of the SAT has a mean of 514 and a standard deviation of 117. If a student scored 615 on the reading part and 619 on the math part. Which part of the test did the student do better?

$$z_{\text{read}} = \frac{615-496}{114} = 1.04 \quad z_{\text{math}} = \frac{619-514}{117} = .90 \quad \boxed{\text{Reading}}$$

30. If a Math 3 Honors test has a mean of 83% and a Standard deviation of 6%, What score do you need to be in the 90th percentile.

$$\approx \boxed{90.69\%}$$