

All answers are exact unless specified in the question. NOTA is “None of the Above”.

1. Given the random data set A = (positive integral factors of 256), find the variance of set A. A is a population.

- A) $\frac{525308}{81}$ B) $\frac{2\sqrt{131327}}{3}$ C) $\frac{131327}{18}$ D) $\frac{\sqrt{262654}}{6}$ E) *NOTA*

2. Given the sets X and Y: $\bar{X} = 28$, $s_x = 5$, $\bar{Y} = 8$, $s_y = 2$, $r = .62$, find the standard deviation of the set (X - Y). X and Y are both random variables.

- A) $\frac{\sqrt{1035}}{5}$ B) $\frac{\sqrt{415}}{5}$ C) $\sqrt{21}$ D) $\sqrt{29}$ E) *NOTA*

3. There are 2574 incoming freshman into the Shermer County school system. Each incoming freshman is asked what science classes (Biology, Chemistry, Physics) they plan to take in high school. Each incoming freshman must choose at least one of the science classes. Here are the results: 331 plan to take Biology only, 466 Chemistry only and 348 Physics only. 562 plan to take Biology and Chemistry, 445 Chemistry and Physics and 646 Biology and Physics. How many incoming freshman plan to take all three science classes?

- A) 224 B) 168 C) 112 D) 56 E) *NOTA*

4. A data set has a sample size of seven. The range of the data set is 78 and the median is 59. The data set forms an arithmetic sequence. Find the interquartile range of the data set.

- A) 13 B) 26 C) 39 D) 52 E) *NOTA*

5. There is a positive linear relationship between the time studying outside of class and their Math grade. Let the time studying be the explanatory variable and the Math grade the response variable. The mean time studying is 8 with a standard deviation of 2. The mean Math grade is 73 with a standard deviation of 6. The correlation between the variables is $r = .73$. Find the equation of the line of best fit in slope intercept form.

- A) $y = 2.19x + 55.48$ B) $y = \frac{73}{300}x - \frac{2929}{300}$ C) $y = 2.19x - 151.87$ D) $y = \frac{73}{300}x + \frac{5329}{75}$ E) *NOTA*

6. Given the following: $P(A) = .56$, $P(B) = .69$, $P(B'|A) = .25$, find $P(A'|B')$.

- A) $\frac{31}{44}$ B) $\frac{27}{31}$ C) $\frac{17}{31}$ D) $\frac{14}{31}$ E) *NOTA*

7. What is the range of the coefficient of determination?

- A) (0, 1) B) (-1, 1) C) [-1, 1] D) [0, 1] E) *NOTA*

8. Mr. Hail gives an Algebra test. The results of the test form a normal distribution. Jane scored an 56, which is at the 35.2 percentile. Evan scored an 78, which is at the 87.7 percentile. Round each z-score needed to two decimal places. Find the mean score on the Algebra test.

- A) $\frac{4461}{70}$ B) $\frac{430}{7}$ C) $\frac{899}{14}$ D) $\frac{1766}{39}$ E) *NOTA*

9. Stacy loves Plain M&M's. She always has a jar of them on her desk at work. She buys a bag to fill the jar. The bag should have the following percentage of color according to the company website: 30% brown, 20% red, 20% blue, 15% yellow, 10% green, 5% orange. Stacy opens the bag and counts the number of plain M&M's by color. The counts are as follows:

Color	Brown	Red	Blue	Yellow	Green	Orange
Frequency	100	68	60	53	35	20

A χ^2 goodness of fit test is run to determine if Stacy's bag of M&M's matches the company percentages. Find the value of χ^2 .

- A) $\frac{89}{56}$ B) $\frac{14}{9}$ C) $\frac{901}{450}$ D) $\frac{635694}{544045}$ E) *NOTA*

10. Mr. Jones gives a Geometry test. The results of the test produce a mean of 68 and a standard deviation of 10. Mr. Jones curves the test so that the new mean of the test is 75 and the standard deviation is 7. Carlos scored an 80 on the test. Find the value of Carlos' curved score.

- A) 83.4 B) 84 C) 84.1 D) 87 E) *NOTA*

11. Florida State University is planning next year's football season. They want to know from the student body if afternoon or evening game times are preferred. They stratify the student body by gender. 250 men and 250 women are randomly selected. 100 men and 125 women prefer afternoon game times. Is there a significant difference in the proportions of men and women who prefer afternoon game times? Find the exact value of the standard deviation needed to run the significance test.

- A) $\frac{7\sqrt{10}}{1000}$ B) $\frac{7\sqrt{10}}{500}$ C) $\frac{3\sqrt{55}}{1000}$ D) $\frac{3\sqrt{55}}{500}$ E) *NOTA*

12. Using the information from the previous problem, find the p value of the significance test. Round your answer to four decimal places.

- A) .0123 B) .0246 C) .9754 D) .9877 E) *NOTA*

13. Given $P(A) = .41$, $P(B) = .65$ and events A and B are independent, find the following: $P(A \cup B) - P(A \cap B) + P(A' \cap B')$

- A) 1.0865 B) 1 C) .7335 D) .467 E) NOTA

14. Stacy is trying to get her dog Dakota to fetch and return a ball to her. Dakota is great at fetching, but not at returning. Dakota fetches and returns the ball 22% of the time, and each fetch and return instance is independent. Stacy takes Dakota to the park and starts practicing the fetch and return drill. Stacy will stay at the park until Dakota fetches and returns the ball once. Find the standard deviation of the situation.

- A) $\frac{50}{11}$ B) $\frac{5\sqrt{78}}{11}$ C) $\frac{\sqrt{2145}}{50}$ D) $\frac{\sqrt{2145}}{250}$ E) *NOTA*

15. The following is information about the breaking weight of student desks based on a simple random sample of 50 desks. The hypotheses are $H_o : \mu = 210$, $H_a : \mu < 210$. Assume that the population standard deviation is $\sigma = 15$. The test rejects H_o at the 1% level of significance. Round the critical value to three decimal places. Calculate the Type II error of the test against the alternative $\mu = 200$. Round your answer to four decimal places.

- A) 0 B) .0042 C) .0085 D) .0100 E) *NOTA*

16. Sumant goes to the mall to sample customers on what stores they would like to see in the future. Sumant samples every 10th person who enters the mall. What type of sample is Sumant performing?

- A) simple random sample B) cluster sample C) stratified sample D) systematic sample E) *NOTA*

17. Saturday is laundry day at the Frost house. It is a three step process in which each step of the process is independent and normally distributed. Step one is organizing the clothes into piles. This step has a mean of 10 minutes and a standard deviation of 2 minutes. Step two is washing and drying the clothes. This step has a mean of 200 minutes and a standard deviation of 15 minutes. Step three is hanging and folding the clothes. This step has a mean of 30 minutes and a standard deviation of 5 minutes. Find the probability that the entire laundry day process takes between 3.5 and 4.5 hours? Round your answer to four decimal places.

- A) .9701 B) .9402 C) .9137 D) .8273 E) *NOTA*

18. Pediatricians want to test a new brand of baby formula with the standard brand. They are hoping to see higher weight gains with newborn babies. The pediatricians mix the formulas using each type of formula at each of three levels of vitamin D, 10% vitamin D, 25% vitamin D and 50% vitamin D. Vitamin D is a crucial vitamin beneficial to the health of newborn babies. The pediatricians feed each diet to 25 newborn babies and record their weight gain on a weekly basis for 12 weeks. How many newborn babies are needed to complete the experiment?

- A) 50 B) 75 C) 150 D) 225 E) NOTA

19. Mr. Hail begins teaching an ACT review class to improve his students' scores. 10 of Mr. Hail's students are randomly selected to take the review class after they took the ACT the first time. They participate in the six week review class, then take the ACT again. The results of the students are below.

Student	1	2	3	4	5	6	7	8	9	10
Pre Class	31	29	15	26	15	12	26	15	23	28
Post Class	35	26	17	24	29	23	33	31	16	24

A significance test is run at the 5% level to determine if Mr. Hail's ACT review class improves student scores. Assume that all test conditions have been met. Find the p value of the test and round your answer to four decimal places.

- A) .1977 B) .1105 C) .0836 D) .0453 E) NOTA

20. The mean of a binomial distribution is 120 and the standard deviation is $\frac{2\sqrt{390}}{5}$. Find the number of trials in the binomial distribution.

- A) 320 B) 250 C) 230 D) 172 E) NOTA

21. Last year, Hillary was running for student body President against Donald. She ran a poll and found that 54% of the student body would vote for her if the election were held that day. Hillary wanted to run another poll. She wanted a margin of error of 2%. Using the previous poll for her sample percentage, how many students would Hillary have to sample at the 97% level of confidence? Round the critical value needed for the problem to two decimal places.

- A) 2195 B) 2209 C) 2925 D) 2944 E) NOTA

22. Every week, Mr. Blizzard goes to Costco once a week to buy concession stand items. Mr. Blizzard randomly selects 40 weeks of purchases. The data produces a mean of \$256.35 and a standard deviation of \$20.52. Find the 95% confidence interval for the true amount of money spent at Costco weekly. Assume all conditions have been met and round your interval to two decimal places.

- A) (249.79, 262.91) B) (249.99, 262.71) C) (249.99, 262.70) D) (249.79, 262.90) E) NOTA

23. Mr. Sleet likes to play card games. He devises the following game. The cost to play is \$10. You randomly draw a card from a standard deck (no jokers). If your card has the following characteristic, you win that amount of money: Red card \$5, Black card \$2, Ace \$10, Face card \$3, Prime number on card \$5, composite number on card \$1. If you have multiple characteristics on your card, then you will win the total amount for all characteristics present. For example, a Red Ace will win you \$15. Find the expected profit Mr. Sleet will make if someone plays his game. Round your answer to two decimal places.

- A) \$6.88 B) \$5.67 C) \$4.33 D) \$3.12 E) NOTA

24. Mr. Frost is interested in whether the student body would prefer to have their pep rallies in the gym or on the football field. He randomly selects 100 students from the school and 58 of them said the football field. Find the 75% confidence interval for the true percentage of the student body that would prefer the football field for pep rallies. Round the z-score needed for the interval to two decimal places. Round each end of the confidence interval to six decimal places.

- A) (.523224, .663776) B) (.523223, .663776) C) (.523241, .636759) D) (.523240, .636759) E) NOTA

25. The population at Oak Hill High is evenly distributed by gender. 31% of students at Oak Hill High drive a car. 42% of the students who drive are male. A student at Oak Hill High is randomly selected. Find the probability that the student does not drive a car, given that the student is female.

- A) $\frac{50}{69}$ B) $\frac{1601}{5000}$ C) $\frac{1849}{2500}$ D) $\frac{1601}{2500}$ E) NOTA

26. There is a positive relationship between a student's performance on the midterm exam and the final exam. The mean of the midterm exam was 66 and the standard deviation was 5. The mean of the final exam was 74 and the standard deviation was 8. The coefficient of determination is .438244. Assume that the midterm exam is the explanatory variable and the final exam is the response variable. Richa earned an 70 on the midterm exam and an 82 on the final exam. Find the value of Richa's residual.

- A) 3.7632 B) 6.345 C) 17.655 D) 20.2368 E) NOTA

27. Stephen Curry of the Golden State Warriors led the NBA last season in free throw shooting with a 91% success rate. In a recent game, Stephen took 12 free throws in a game. Assume each free throw is independent. Find the probability that Stephen made more than five but less than 10 free throws in the game. Round your answer to four decimal places.

- A) .2948 B) .2945 C) .0866 D) .0863 E) NOTA

28. Ms. Lambert gives a Geometry test. The results of the test form a normal distribution with a mean of 76 and a standard deviation of 8. Find the probability that a randomly selected student scored between 71 and 88 on the test. Round your answer to four decimal places.

- A) .8750 B) .8749 C) .6673 D) .6672 E) NOTA

29. Dr. Chang gives a Biology test. The results of the test form a normal distribution with a mean of 68 and a standard deviation of 5. Find the probability that a randomly selected student scored greater than 78, given that the student scored less than 85. Round your answer to four decimal places.

- A) .0228 B) .0224 C) .0150 D) .0003 E) NOTA

30. Given the following set of data: 41, 13, 96, 53, 79, 28, 12, 67, 9, 79, 50, 17, 22, 46

find the following: M = the mean of the data, N = the median of the data, O = the interquartile range of the data, P = the mode of the data. Find the exact value of $\frac{MO}{NP}$.

- A) $\frac{3027}{56}$ B) $\frac{13311}{27650}$ C) $\frac{8058}{5075}$ D) $\frac{10200}{16037}$ E) *NOTA*