

February Statistics Regional

All answers are exact unless otherwise specified in the question. NOTA is short for none of the above.

Use the following information to answer questions 1-2.

There are 46 students in a class. 30 students take Math, 26 students take English and 22 students take History. 10 take Math only, 9 take English only and 3 take History only. 8 students take all three courses. Each student takes at least one class.

1. How many students take Math and English only?

- a) 7 b) 4 c) 5 d) 6 e) *NOTA*

2. Find the value of the following: $P((M \cap E') \cup (E \cap H))$.

- a) $\frac{31}{46}$ b) $\frac{29}{46}$ c) $\frac{11}{23}$ d) $\frac{21}{46}$ e) *NOTA*

3. Data set X has a mean of 36 and a standard deviation of 5. Data set Y has a mean of 89 and a standard deviation of 12. Find the mean and standard deviation of the data set (X+Y). Answers will be in the form (mean, standard deviation).

- a) (125,17) b) (125,13) c) (62.5,17) d) (62.5,13) e) *NOTA*

4. Given the data set: 1, 6, 8, 9, 10, 1, 6, 8, 10, 1

Let A= mode of the data, let B= mean of the data and let C= median of the data. Find the solutions of $Ax^2 + Bx - C = 0$.

- a) 1 and -7 b) -1 and 7 c) $\frac{-7 \pm \sqrt{73}}{2}$ d) $\frac{7 \pm \sqrt{73}}{2}$ e) *NOTA*

5. The following is information about two sets of data:

$\bar{x} = 93$, $S_x = 8$, $\bar{y} = 62$, $S_y = 5$, $r = .72$. Find the equation of the least squares regression line in slope intercept form.

- a) $y = \frac{5}{8}x + \frac{31}{8}$ b) $y = \frac{9}{20}x + \frac{403}{20}$ c) $y = \frac{8}{5}x - \frac{434}{5}$ d) $y = \frac{144}{125}x - \frac{5642}{125}$ e) *NOTA*

6. Vitamin C content is being measured in cans of corn. A random sample of 8 cans is chosen. The mean of the vitamin C content is 22.5 with a standard deviation of 7.19.

Using the appropriate chart, calculate the 95% confidence interval for the mean content of vitamin C for all cans of corn. Round your answer to four decimal places.

- a) (16.6380,28.6319) b) (16.6380,28.3620) c) (16.4880,28.5119) d) (16.4881,28.5119) e) *NOTA*

7. The results of a statistics test are normally distributed. 9.34% of the scores are less than 64, and 5.82% of the scores are greater than 93. Using the appropriate chart, find the mean. Round the answer to two decimal places.

- a) 77.24 b) 77.25 c) 79.75 d) 79.76 e) *NOTA*

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8. Shaquille O'Neal is a basketball player who makes 53% of his free throws over the course of the basketball season. In a key game, Shaquille shoots 17 free throws. What is the probability that he makes between 9 and 13 free throws (inclusive)? Round your answer to five decimal places.

- a) .58693 b) .39592 c) .98773 d) .59181 e) *NOTA*

9. Find the standard deviation of the following discrete distribution.

X	2	3	5	6	8	9
P(X)	.2	.1	.3	.1	.2	.1

Round your answer to two decimal places.

- a) 1.06 b) 2.36 c) 2.37 d) 5.61 e) *NOTA*

10. Mr. Snow's statistics class took their midterm exam last week. The mean of the scores of the exam were 73 with a standard deviation of 5. Mr. Snow would like to transform the scores so that the mean is 80 and the standard deviation is 4. Find the transformation equation in slope intercept form.

- a) $y = x + 7$ b) $y = \frac{5}{4}x - \frac{45}{4}$ c) $y = \frac{4}{5}x + 7$ d) $y = \frac{4}{5}x + \frac{108}{5}$ e) *NOTA*

11. 10 percent of students at Smith High School have a blood disorder. All the students are tested. 85 percent of students who have the blood disorder test positive, while 2 percent of those students who do not have the blood disorder test positive. Given that a student tests positive, find the probability that they do not have the blood disorder.

- a) $\frac{1}{10}$ b) $\frac{103}{1000}$ c) $\frac{85}{103}$ d) $\frac{18}{103}$ e) *NOTA*

12. The following is information about the SAT Math scores of Florida high school students based on a simple random sample of 500 students. The hypotheses are $H_0 : \mu = 450$, $H_a : \mu > 450$. Assume that the population standard deviation is $\sigma = 125$. The test rejects H_0 at the 5% level of significance. Using the appropriate chart, calculate the power of the test against the alternative $\mu = 460$. Round your answer to four decimal places.

- a) .5557 b) .5558 c) .5571 d) .5572 e) *NOTA*

13. Which of the following ways can increase the power of a test?

- I. Increase level of significance II. Increase sample size III. Increase standard deviation
a) *I only* b) *II only* c) *I and II* d) *I, II, III* e) *NOTA*

14. The mean of a set of data is 100 and the variance is 625. Calculate the coefficient of variation.

- a) $\frac{25}{4}$ b) 4 c) $\frac{1}{4}$ d) $\frac{4}{25}$ e) *NOTA*

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15. Given the following, $P(A) = 0.4$, $P(B) = 0.5$, $P(A|B) = 0.6$, find $P(B|A')$.

- a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) $\frac{4}{5}$ d) 1 e) *NOTA*

16. The following is information about two sets of data: $\bar{x} = 96$, $S_x = 14$, $\bar{y} = 68$, $S_y = 9$ and the equation of the least squares regression line is $y = .45x + 24.8$. Find the coefficient of determination. Find the answer correct to two decimal places.

- a) .08 b) .29 c) .49 d) .70 e) *NOTA*

17. Ms. Lewis takes two simple random samples. One is a sample of 45 Calculus students from her classes in the 1990's. The other is a sample of 92 Calculus students from her classes in the years 2000-2005. They are asked if they were satisfied with her class. 27 students from the 1990's and 69 students from 2000-2005 said they were satisfied. Using the appropriate chart, find the 90% confidence interval for the difference between the two groups of students. Assume you are finding the interval with positive differences. Round your answer to five decimal places.

- a) (.00877, .29123) b) (.00878, .29122) c) (.00876, .29122) d) (.00878, .29123) e) *NOTA*

18. A die is rolled 100 times. The results are listed in the following chart:

Value	1	2	3	4	5	6
Frequency	15	20	25	20	10	10

Performing a goodness of fit test to determine if the die is fair, calculate the chi-square value. Round your answer to two decimal places.

- a) 0 b) 12.96 c) 13.21 d) 11.00 e) *NOTA*

19. Which of the following can show a cause and effect relationship between two variables?

- a) observational study b) controlled experiment c) sample survey d) census e) *NOTA*

20. In an algebra one class, a linear regression equation is used to predict the final exam score based on the midterm exam score. The equation for the class is $y = .75x + 20$, where x is the midterm exam score and y is the final exam score. Savannah scored an 90 on the midterm exam and 80 on the final exam. Find the value of Savannah's residual.

- a) -7.5 b) 7.5 c) 10 d) 87.5 e) *NOTA*

21. The scores on Ms. Lambert's Calculus test follow a normal distribution with a mean of 74 with a standard deviation of 6. What percentage of the students have earned scores between 65 and 89? Using the appropriate chart, Please round your answer to one decimal place.

- a) 6.1 b) 86.6 c) 92.7 d) 98.8 e) *NOTA*

22. On her first six tests, Ellen earned scores of 67, 78, 80, 88, 91, and 85. What must she average on her next three tests to have an average for the class of at least 86?

- a) 92 b) 93 c) 94 d) 95 e) *NOTA*

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23. 62% of students play a sport for one of their high school teams. For a group of 55 randomly selected students, find the standard deviation for the number of students who play a sport. Please round your answer to two decimal places.

- a) 34.10 b) 12.96 c) 5.84 d) 3.60 e) *NOTA*

24. From a standard deck of cards (no jokers), you are dealt a five card hand. Find the probability that you get four of a kind.

- a) $\frac{1}{54145}$ b) $\frac{1}{4165}$ c) $\frac{1}{199920}$ d) $\frac{1}{2598960}$ e) *NOTA*

25. In a frequency distribution of 5000 scores, the mean is 75 and the median is 95. One would expect this distribution to be:

- a) skewed to the left b) skewed to the right c) symmetrical d) bimodal e) *NOTA*

26. Which of the following are true statements?

I. The standard deviation is the variance squared. II. The standard deviation is always positive. III. The standard deviation is strongly affected by outliers.

- a) *I only* b) *II only* c) *III only* d) *II and III* e) *NOTA*

27. What is the purpose of residual plots?

- a) To determine causation. b) To assess the type of relationship that exists between x and y. c) To check the appropriateness and fit of the regression equation for the data. d) To provide predictions for the response variable. e) *NOTA*

28. The independent random variables X and Y are defined by the following probability distribution tables. Determine the standard deviation of $4X + 5Y$. Round your answer to two decimal places.

X	1	3	6	Y	2	3	5	7
P(X)	.6	.3	.1	P(Y)	.1	.2	.3	.4

- a) 15.38 b) -2.76 c) 11.05 d) 10.62 e) *NOTA*

29. The p-value of a test of significance is the probability that:

- a) The decision resulting from the test is correct. b) The null hypothesis is true. c) The alternative hypothesis is true. d) 95% of the confidence intervals will contain the parameter of interest. e) *NOTA*

30. Which of the following is a criteria for choosing a t-test rather than a z-test when making an inference about the mean of a population?

- a) The mean of the population is unknown. b) The population is not normally distributed. c) The sample size is less than 40. d) The standard deviation of the population is unknown. e) *NOTA*