

Mu Statistics  
2007 Mu Alpha Theta National Convention

---

Unless specifically stated in the question, all answers are exact. NOTA is “None of the Above”.  
TABLES ARE ATTACHED.

1. Calculate the standard deviation of the following data: 1, 2, 3, 4, 5
  - a)  $\sqrt{2}$
  - b)  $\frac{\sqrt{10}}{2}$
  - c) 1.41
  - d) 1.58
  - e) *NOTA*
  
2. Which of the following is a resistant measure?
  - a) *mean*
  - b) *standard deviation*
  - c) *correlation coefficient*
  - d) *range*
  - e) *NOTA*
  
3. There are 20 red marbles, 10 blue marbles and 5 green marbles in a jar. Marbles are chosen, one at a time, with replacement, until a blue marble is chosen. Find the mean and standard deviation of this situation. Round the mean to two decimal places and the standard deviation to three decimal places. Answers are in the form (mean, standard deviation).
  - a) (1.75,1.146)
  - b) (3.50,2.958)
  - c) (1.75,1.581)
  - d) (3.50,0.866)
  - e) *NOTA*
  
4. Company management wants a report of the mean widgets produced for the day accurate to within  $\pm 5$  with 95% confidence. How large a sample of widgets must be measured to comply with this request, given that the standard deviation of all widgets produced per day is 43? Use the charts provided to answer the question.
  - a) 200
  - b) 201
  - c) 284
  - d) 285
  - e) *NOTA*
  
5. Which of the following are true statements?
  - I. The standard deviation is the square of the variance.
  - II. The standard deviation is always positive.
  - III. The standard deviation is strongly affected by outliers.
  - a) *II only*
  - b) *III only*
  - c) *II and III*
  - d) *I, II, and III*
  - e) *NOTA*
  
6. Savannah loves to eat M+M's. She wants to determine if her bag of plain M+M's meets the distribution standards set by the company. Her bag contained 21 brown, 12 blue, 10 red and 7 green M+M's. The company says that each bag should contain 40% brown, 25% blue, 25% red and 10% green. Find the chi-square value of Savannah's bag.
  - a) 1.47
  - b) 1.98
  - c) 0.59
  - d) 0.77
  - e) *NOTA*
  
7. If  $P(A) = \frac{2}{7}$  and  $P(B) = \frac{3}{5}$  and  $P(B|A) = \frac{1}{10}$ , find  $P(A|B')$ .
  - a)  $\frac{5}{7}$
  - b)  $\frac{24}{35}$
  - c)  $\frac{9}{14}$
  - d)  $\frac{9}{25}$
  - e) *NOTA*

Mu Statistics  
2007 Mu Alpha Theta National Convention

---

8. Find the mean of the following discrete distribution.

X	10	12	15	18	22	25
P(X)	0.1	0.2	0.15	0.3	0.12	0.13

a) 16 b) 17 c) 16.5 d) 16.94 e) *NOTA*

9. The following is given about two sets of data:  $\bar{x} = 64$ ,  $S_x = 4$ ,  $\bar{y} = 82$ ,  $S_y = 6$ ,  $r = .85$ .

Find the line of best fit equation in slope intercept form.

a)  $y = \frac{51}{40}x + \frac{2}{5}$  b)  $y = \frac{17}{30}x + \frac{686}{15}$  c)  $y = \frac{51}{40}x - \frac{811}{20}$  d)  $y = \frac{17}{30}x + \frac{263}{15}$  e) *NOTA*

10. Ms. Lambert's class took a Calculus midterm. The scores form a normal distribution. Sam scores a 91, which is at the 90.49 percentile. Brian scores a 66, which is at the 20.90 percentile. Using the appropriate chart, find the mean of the Calculus midterm, rounded to two decimal places.

a) 78.50 b) 82.35 c) 75.55 d) 86.21 e) *NOTA*

**Use the following information to answer questions 11-12.**

There are 31 students in Ms. Bieberdorf's English class. 20 of them take Math, 13 take Science, and 23 take Computers. 10 take Math and Science, 8 take Science and Computers, and 13 take Math and Computers. Six students take all three courses. Every student in the class takes at least one course.

11. How many students take Computers only?

a) 1 b) 3 c) 6 d) 8 e) *NOTA*

12. Find the probability that a randomly selected student is in Math or Computers.

a)  $\frac{20}{31}$  b)  $\frac{23}{31}$  c)  $\frac{30}{31}$  d) 1 e) *NOTA*

13. A vendor notes that 40% of customers who buy snack cakes make use of a store coupon to receive a discount. If nine people purchase snack cakes, what is the probability that fewer than four will use a coupon?

a)  $\frac{2413}{5000}$  b)  $\frac{42861}{100000}$  c)  $\frac{942597}{1953125}$  d)  $\frac{24130483}{100000000}$  e) *NOTA*

Mu Statistics  
2007 Mu Alpha Theta National Convention

---

14. Suppose X and Y are random variables with  $\mu_x = 85$ ,  $\sigma_x = 7$ ,  $\mu_y = 12$ ,  $\sigma_y = 2$ . Given that X and Y are independent, what is the standard deviation of the random variable (X-2Y)?

- a) 3   b) 11   c)  $\sqrt{33}$    d)  $\sqrt{65}$    e) *NOTA*

15. Sampling error is

- a) the standard deviation of a sample  
b) the standard error of a sample  
c) the result of bias  
d) the difference between a population parameter and an estimate of that parameter  
e) *NOTA*

16. In the following table, what value for n results in a table showing perfect independence?

n	68
40	170

- a) 16   b)  $\frac{278}{3}$    c) 100   d) 142   e) *NOTA*

17. Here are 10 ACT Math scores for students from a rural school district:

31   31   33   36   23   34   32   30   20   24

ACT Math scores are approximately normal. Suppose that the standard deviation of the ACT Math scores in this school district is known to be  $\sigma = 4$ . Give a 95% confidence interval for the mean ACT Math score among all students in the district. The answers will be in the form (lower bound, upper bound). Round each bound to five decimal places. Use the charts provided to answer the question.

- a) (26.92077,31.87922)   b) (26.92077,31.87923)   c) (27.31922,31.48077)   d) (27.31922,31.48078)   e) *NOTA*

18. The following is information about the blood pressures of executives based on a simple random sample of 100 executives. The hypotheses are  $H_o = 128$ ,  $H_a > 128$ . Assume that the population standard deviation is  $\sigma = 15$ . The test rejects  $H_o$  at the 5% level of significance. Using the appropriate chart, calculate the power of the test against the alternative  $\mu = 134$ . Round your answer to four decimal places.

- a) .0594   b) .6554   c) .9906   d) .9909   e) *NOTA*

Mu Statistics  
2007 Mu Alpha Theta National Convention

---

19. Mrs. Tucker gives a test in her Algebra 2 class. The test statistics are a mean of 76 and a standard deviation of 5. Mrs. Tucker would like to transform the scores so that the mean of the class is 85 and the standard deviation is 3. Find the transformation equation for this situation in slope intercept form.

a)  $y = -2x + 237$    b)  $y = \frac{5}{3}x - \frac{125}{3}$    c)  $y = \frac{3}{5}x + \frac{197}{5}$    d)  $y = x + 9$    e) *NOTA*

20. Sam has the following scores on his first seven Calculus BC tests:

86    79    93    90    81    74    92

What must Sam average on his next three tests in order to have at least an 88% average in the class?

a) 94   b) 95   c) 96   d) 97   e) *NOTA*

21. Let the set  $X$ =(the factors of 60). Let  $A$ =(the mean of  $X$ ) and  $B$ =(the median of  $X$ ). Find the value of  $A-B$ .

a) 4   b) 6   c) 8   d) 10   e) *NOTA*

22. Given the following statistical information:  $\mu_x = 24$ ,  $S_x = 5$ ,  $\mu_y = 65$ ,  $S_y = 8$  and the equation of the line of best fit is  $y = 1.2x + 36.2$ , find the coefficient of determination.

a)  $\frac{9}{16}$    b)  $\frac{25}{36}$    c)  $\frac{3}{4}$    d)  $\frac{5}{6}$    e) *NOTA*

23. The student breakdown at Deerfield Beach High is 63% boys. 85% of the boys and 56% of the girls like to watch their football team. Given that a student likes to watch the football team at Deerfield Beach High, find the probability that the student is a boy.

a)  $\frac{259}{1250}$    b)  $\frac{1071}{2000}$    c)  $\frac{765}{1061}$    d)  $\frac{7427}{10000}$    e) *NOTA*

24. Suppose you wish to compare the average class size of math classes to the average class size of science classes in your high school. Which is the most appropriate technique for gathering the needed data?

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

Mu Statistics  
2007 Mu Alpha Theta National Convention

---

25. It is reported that the national average cost of a cable bill is \$65.25. Suppose you interview a simple random sample of 25 people in your community who recently paid their cable bill. The sample mean is \$68.75 with a standard deviation of \$4.20. Using the appropriate chart, find a 90% confidence interval estimate of the cost of a cable bill in your area. The answers are in the form (lower bound, upper bound). Round each bound to four decimal places.
- a) (67.3152, 70.1847)   b) (67.3153, 70.1847)   c) (67.3127, 70.1872)   d) (67.3128, 70.1872)   e) *NOTA*
26. Which of the following statements are true?
- I. If bias is present in a sampling procedure, it can be overcome by dramatically increasing the sample size.
  - II. Convenience samples often lead to undercoverage bias.
  - III. Questionnaires with nonneutral wording are likely to have response bias.
- a) *I and II*   b) *II and III*   c) *I and III*   d) *I, II, and III*   e) *NOTA*
27. Mr. Snow's final exam results for his statistics class form a normal distribution with mean 75 and standard deviation 5. Find the probability that a student's score is between 66 and 87? Using the appropriate chart, round your answer to two decimal places.
- a) .94   b) .95   c) .96   d) .97   e) *NOTA*
28. Which of the following is most useful in establishing a cause and effect relationship?
- a) census
  - b) simple random sample
  - c) least squares regression line with high correlation
  - d) controlled experiment
  - e) *NOTA*
29. There are 14,256 men and 16,352 women at a local university. If 15% of the men and 22% of the women are education majors, what is the expected number of education majors in a random sample of 200 students? Round your answer to the nearest student.
- a) 37   b) 38   c) 45   d) 74   e) *NOTA*
30. Joe can travel to work by car, bus or bicycle. The probability that Joe will travel by car on any given day is 0.6. The probability that Joe will travel by bus on any given day is 0.3. Each day is independent of each other. Find the probability that in a given three day period, Joe travels twice by car and once by bicycle or twice by bus and once by car.
- a) .09   b) .18   c) .27   d) .36   e) *NOTA*