Statistics Individual
Vero Beach Invitational January 2004

For all questions, E. NOTA means none of the above answers is correct.

1. A distribution of student's GPA's is skewed to the left. The mean GPA is 3.36 and the mode GPA is 3.69. Which of the following is the most likely value of the median GPA?

A. 3.75 B. 2.85 C. 4.00 D. 3.55 E. NOTA

2. Every human being has a blood type of either A, B, AB, or O. In addition, each blood type can have a Rhesus factor (Rh) of + (positive) or – (negative). How many possibilities are in the sample space for a person's specific blood type?

A. 3 B. 6 C. 8 D. 1 E. NOTA

3. An engineering company is going to implement an assembly line that consists of four steps. The steps can be done in any sequence. If the company wishes to compare the assembly time for each of the sequences, how many different sequences will be involved in the experiment?

A. 24 B. 6 C. 16 D. 256 E. NOTA

4. An experiment done by a microbiology professor took samples of bacteria to find out how long each specimen would survive in an environment with excessive ultra violet light. The data set showed that the average length was 25.6 hours with a variance of 2.3. What is the standard deviation of this data? (Approximate to the nearest hundredth)

A. 1.52 B. 11.13 C. 5.29 D. 23.3 E. NOTA

5. How many seven-digit telephone numbers can be formed if the first digit cannot be zero?

A. 720 B. $9(10^6)$ C. 5040 D. 9^7 E. NOTA

6. Simplify the following expression: $\binom{n}{k}+\binom{n}{k-1}$

A. $\binom{2n}{2k-1}$ B. $\binom{n}{n-k}$ C. $\binom{n+1}{k}$ D. $\binom{k}{n}$ E. NOTA

7. Given that $0 < P(A) < 1$, $0 < P(B) < 1$, and $P(A) < P(A|B)$. Which of the following statements must be true?

A. $P(A) < P(B)$ B. $P(A|B) = P(A \text{ and } B)$ C. $P(A) = P(B)$

D. $P(B) < P(B|A)$ E. NOTA

8. A smoke detector system uses two sensors, X and Y. If smoke is present, the probability that is will be detected by sensor X is 0.95; by sensor Y, 0.90; and by both devices, 0.88. Find the probability that smoke will go undetected.

A. 0.075 B. 0.12 C. 0.1 D. 0.05 E. NOTA

9. A dealer will deal 13 cards at random. What is the probability that none of the cards are spades? (Approximate to the nearest thousandth)

A. 0.025 B. 0.082 C. 0.308 D. 0.013 E. NOTA

10. Kevin invents a gambling game that costs \$5 to play. The game consists of rolling a single die one time. If the outcome is a 1 then the player gets his \$5 back. If the outcome is an even number, then the player wins \$2 in addition to getting his \$5 back. Otherwise, the player loses his \$5. What is Kevin's average profit per roll of the die? (Approximate to the nearest cent)

A. \$0.67 B. \$1.83 C. \$0.50 D. Kevin incurs an average loss E. NOTA

11. Suppose that a shipment of 5000 electrical fuses contains 5% defectives. If a sample of five fuses is tested, find the probability of observing at least one defective. (Approximate to the nearest thousandth)

A. 0.774 B. 0.226 C. 0.001 D. 0.05 E. NOTA

12. The probability that a patient recovers from a stomach disease is 0.8. Suppose 20 people are known to have contracted this disease. What is the probability that exactly 14 people recover? (Approximate to the nearest hundredth)

A. 0.04 B. 0.11 C. 0.17 D. 0.70 E. NOTA

13. In a class of 21 students the average score on a math test was 77%. If John got 95% and Casey got 78%, find the average grade of the other 19 students. (Approximate to the nearest percentage)

A. 77% B. 73% C. 87% D. 74% E. NOTA

14. A soft-drink machine can be regulated so that it discharges an average of μ ounces per cup. If the ounces of fill are normally distributed with standard deviation 0.3 ounce, give the setting for μ so that 8-ounce cups will only overflow 1% of the time. (Approximate to the nearest tenth of an ounce)

A. 7.7 B. 7.5 C. 6.9 D. 7.9 E. NOTA

15. A geological study indicated that an exploratory oil well should strike oil with probability 0.2. What is the probability that the third strike comes on the seventh well drilled? (Approximate to the nearest hundredth)

A. 0.51 B. 0.05 C. 0.09 D. 0.12 E. NOTA

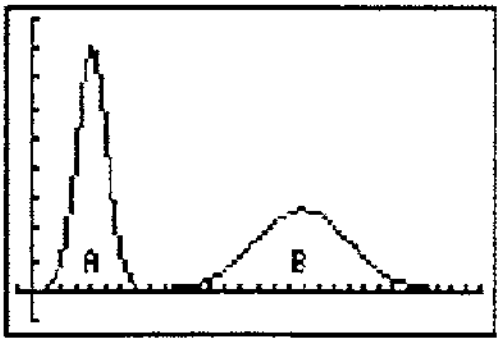
16. Assume that a statistical test yields a p-value $< \alpha$ where α is your predetermined statistical significance level. Which of the following is a correct and statistically sound conclusion?

A. Accept the null hypothesis.
B. Fail to reject the null hypothesis.
C. Reject the null hypothesis.
D. Reject the alternative hypothesis
E. NOTA

17. A random variable, Z, is uniformly distribution between 0 and 50, inclusively (e.g. $0 \leq Z \leq 50$). What is the probability that $Z > 10$?

A. 0.10 B. 0.20 C. 0.80 D. 0.90 E. NOTA

18. In the accompanying display, which has the smaller mean and which has the larger standard deviation?



A. Smaller mean, A; larger standard deviation, A
B. Smaller mean, A; larger standard deviation, B
C. Smaller mean, B; larger standard deviation, A
D. Smaller mean, B; larger standard deviation, B
E. NOTA

19. Suppose the correlation between two variables, x and y, is $r = 0.23$. What will the new correlation value be if 0.14 is added to all values of the x-variable, every value of the y-variable is doubled, and the two variables are interchanged?

A. 0.23 B. 0.37 C. 0.74 D. -0.23 E. NOTA

20. A study considers the variable: The weight of an automobile. Which of the following is true?

A. The case of the variable is automobile and it is a measurement variable.
B. The case of the variable is automobile and it is a categorical variable.
C. The case of the variable is weight and it is a measurement variable.
D. The case of the variable is weight and it is a categorical variable.
E. None of the above.

21. In a game of chance, you win if a roll of a die is either a 1 or a 6. You decide to roll the die 45 times. X is the number of times you win. Find $P(X = 13)$. (Approximate to the nearest thousandth)

A. 0.059 B. 0.123 C. 0.189 D. 0.106 E. NOTA

22. Assume that the random variable X from the previous problem is normally distributed. Approximate $P(X \geq 13)$ to the nearest thousandth.

A. 0.653 B. 0.736 C. 0.894 D. 0.755 E. NOTA

23. The distribution of lifetimes for a certain type of light bulb is normally distributed with a mean of 1000 hours and a standard deviation of 100 hours. Find the 33rd percentile of the distribution of lifetimes.

A. 560 B. 330 C. 1044 D. 1440 E. NOTA

24. Which of the following pairs of events are mutually exclusive?

A. X: the odd numbers; Y: the number 5
B. X: the even numbers; Y: the numbers greater than 10
C. X: the numbers less than 5; Y: all negative numbers
D. X: the numbers above 100; Y: the numbers less than -200
E. NOTA

25. An experiment is conducted to determine if the use of certain specified amounts of a drug will increase the IQ scores differentially for high and low anxious students in the fifth grade.

In this experiment, IQ serves as:

A. A primary independent variable
B. A moderator variable
C. A dependent variable
D. A control variable
E. NOTA

26. A researcher finds that the correlation between the personality traits "greed" and "superciliousness" is -.40. What percentage of the variation in greed can be explained by the relationship with superciliousness?

A. 60% B. 0% C. 16% D. 20% E. NOTA

27. If the correlation between age of an auto and money spent for repairs is +0.90, which of the following is true?

A. 81% of the variation in the money spent for repairs is explained by the age of the auto
B. 81% of money spent for repairs is unexplained by the age of the auto
C. 90% of the money spent for repairs is explained by the age of the auto
D. 18% of the money spent for repairs is explained by the age of the auto
E. NOTA

28. A probability density function f(x) is defined as follows: $f(x) = \begin{cases} c & \text{for } 4 \le x \le 10 \\ 0 & \text{elsewhere} \end{cases}$

Where c is a real constant. What is the probability of c?

A. 5 B. $\frac{1}{6}$ C. $\frac{1}{5}$ D. $\frac{1}{7}$ E. NOTA

29. If the size of the sample being used is increased, then the width of a 0.95 confidence interval estimate for a population mean will:

A. Become narrower.
B. Become wider.
C. Not be changed.
D. The effect on the width cannot be determined from the given information.
E. NOTA

30. Y is a discrete random variable with distribution shown in the table. Find $E(Y^2 - 1)$. (Approximate to the nearest hundredth)

A. 0.97 B. –0.03 C. 0.75 D. 4.03 E. NOTA