All answers are exact, unless specified in the question. NOTA means none of the above answers is correct.

1. Given the following set of random data:

8, 2, 7, 10, 6, 13, 11, 1

Let A = the mean of the data, B = the median of the data, and C = the standard deviation of the data. Find the value of ABC.

A) $\frac{27\sqrt{247}}{2}$ *B*) $\frac{203\sqrt{247}}{16}$ *C*) $\frac{29\sqrt{3458}}{8}$ *D*) $\frac{435\sqrt{3458}}{112}$ *E*) *NOTA*

2. Mrs. Lynch loves Starbursts. She opens a bag of Starbursts and finds the following: 14 Orange, 17 Red, 22 Yellow and 10 Pink. The distribution of any bag of Starbursts, according to the candy company, is suppose to be 25% Orange, 30% Red, 35% Yellow and 10% Pink. Find the χ^2 value if a goodness of fit test is performed to determine if the bag matches up with the candy company's distribution.

A) 2.5586 *B*) 1.8002 *C*) $\frac{3385}{1323}$ *D*) $\frac{673281}{374000}$ *E*) *NOTA*

Use the following information to answer questions 3 and 4.

There are 120 students in the senior class at Columbus High. 57 students take Biology, 62 students take Chemistry and 59 students take Physics. 22 take Biology and Chemistry, 21 take Biology and Physics and 25 take Chemistry and Physics. 10 students take all three classes and every student in the senior class takes at least one of the three sciences.

3. Find the number of students who take Biology only.

A) 4 B) 14 C) 24 D) 25 E) NOTA

4. Find the probability of a student taking at least two classes, given that the student is taking Physics.

A) $\frac{56}{59}$ *B*) $\frac{36}{59}$ *C*) $\frac{26}{59}$ *D*) $\frac{23}{59}$ *E*) *NOTA*

5. The results of Mr. Dipierro's midterm exam form a normal distribution with a mean of 77 and a standard deviation of 4.2. Find the proportion of students who score greater than 90 or less than 65. Use the appropriate chart to answer the question.

A) .9978 B) .0022 C) .9969 D) .0031 E) NOTA

6. How many of the following are resistant measures?

I. Mean II. Median III. Standard deviation IV. Range V. Interquartile Range

A) 1 B) 2 C) 3 D) 4 E) NOTA

7. John plays a card game with a standard deck of cards (no jokers). John picks one card from the deck. If John picks a face card (jack, queen, or king) or a prime number, he wins $12. In order for the game to be fair, what amount must John lose if he does not pick a face card or a prime number?

A) 18 B) 16 C) 14 D) 12 E) NOTA

8. Alice wants to be a better softball player. She plays catch with her brother everyday after school and catches the ball 65% of the time. One day after school, Alice plays catch with her brother. Her brother throws her 180 balls, one at a time. Find the mean and standard deviation of the number of balls Alice catches that day. Answers will be in the form (mean, standard deviation).

A) $\left(117, \frac{3\sqrt{455}}{10}\right)$ *B)* $\left(117, \frac{2\sqrt{35}}{13}\right)$ *C)* $\left(63, \frac{3\sqrt{455}}{10}\right)$ *D)* $\left(63, \frac{2\sqrt{35}}{13}\right)$ *E) NOTA*

9. The following information about the ACT Math scores of Florida high school students based on a simple random sample of 300 students. The hypotheses are $H_o : \mu = 23, \quad H_a : \mu > 23$. Assume that the population standard deviation is $\sigma = 4$. The test rejects H_o at the 5% level of significance. Using the appropriate chart, calculate the power of the test against the alternative $\mu = 23.5$. Round your answer to four decimal places.

A) .5832 B) .5833 C) .6984 D) .6985 E) NOTA

10. A distribution of data is skewed to the right. What is the relationship between the mean and the median?

A) Mean = Median B) Mean > Median C) Mean < Median D) There is not enough information given to answer the question. E) NOTA

Use the following information to answer questions 11 and 12.

X	1	2	3	4	5	6	7
P(X)	.04	.10	.12	.32	.15	.11	.16

11. Find the mean of the distribution above.

A) 3.78 B) 4 C) 4.41 D) 13.42 E) NOTA

12. Find the standard deviation of the distribution from the previous page. Round your answer to two decimal places.

A) .67 B) .68 C) 1.65 D) 1.66 E) NOTA

13. Given the following set of data, find the equation of the line of best fit in slope intercept form: $\bar{x} = 53,\ s_x = 4,\ \bar{y} = 84,\ s_y = 7,\ r = .81.$

A) $y = \frac{567}{400}x + \frac{3549}{400}$ *B*) $y = \frac{81}{175}x + \frac{10407}{175}$ *C*) $y = \frac{567}{400}x - \frac{6607}{100}$ *D*) $y = \frac{81}{175}x + \frac{353}{25}$ *E*) *NOTA*

14. Suppose X and Y are random variables where the mean and standard deviation of X is 12 and 5, respectively, and the mean and standard deviation of Y is 10 and 2, respectively. What are the mean and standard deviation of the random variable (4X – 2Y)? The answers are expressed in the form (mean, standard deviation).

A) $(28,3)$ *B*) $(28,16)$ *C*) $(28,8\sqrt{6})$ *D*) $(28,4\sqrt{26})$ *E*) *NOTA*

15. Which of the following are true statements?

I. All symmetric histograms have single peaks.

II. The mean is smaller than the median when a distribution is skewed to the right.

III. All normal curves are bell-shaped and symmetric.

A) I only B) III only C) I and II D) I and III E) NOTA

16. Ms. Hester gives her Chemistry midterm. The results of the midterm are a mean of 70 and a standard deviation of 5. She curves the scores so that the new results of the midterm are a mean of 80 and a standard deviation of 8. Jane scores an 80 on the midterm. Find Jane's score after the curve has been applied.

A) 80 B) 90 C) 91.7 D) 96 E) NOTA

17. The average number of daily absences at a school is 225 with a standard deviation of 30. In a simple random sample of 45 days, what is the probability that the mean number of daily absences is between 210 and 230? Use the appropriate chart to answer the question.

A) .1318 B) .8682 C) .259 D) .741 E) NOTA

18. A confidence interval is determined from the grade point averages of a simple random sample of n students. Which of the following will produce a smaller margin of error?

I. smaller sample size II. smaller standard deviation III. smaller confidence level

A) II only B) III only C) II and III D) I, II and III E) NOTA

19. Which of the following are true statements?

I. Based on careful use of control groups, experiments can often indicate cause and effect relationships.

II. In an observational study, the participants select which group they are in.

III. A complete census is the only way to establish a cause and effect relationship.

A) I only B) III only C) I and II D) I and III E) NOTA

20. A simple random sample of 25 calculator batteries are tested and show a mean life expectancy of 500 hours with a standard deviation of 12 hours. Determine a 95% confidence interval estimate for this mean life expectancy. Use the appropriate chart to answer the question. Round each endpoint of the interval to 3 decimal places.

A) $(495.046, 504.954)$ *B*) $(495.046, 504.953)$ *C*) $(495.460, 504.540)$ *D*) $(495.056, 504.944)$ *E*) *NOTA*

21. Given that $P(A)=\frac{12}{25},\ P(B)=\frac{37}{100}$ *and* $P(A'\mid B')=\frac{26}{63},$ *find* $P(A\mid B).$

A) $\frac{37}{63}$ *B*) $\frac{26}{37}$ *C*) $\frac{15}{37}$ *D*) $\frac{11}{37}$ *E*) *NOTA*

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

n	52
65	100

A) 17 B) 33.8 C) 34.5 D) 39 E) NOTA

23. Sampling error occurs

A) when statisticians make mistakes, resulting in bias.
B) when samples are too small.
C) because a sample statistic is used to estimate a population parameter.
D) when statisticians do not use random selection in picking the sample.
E) NOTA

24. What is the probability of a Type II error when a hypothesis test is being conducted at the 5% significance level $(\alpha = .05)$?

A) .05 B) .10 C) .025 D) .95 E) NOTA

25. A box of baseballs have an average weight of 24 ounces with a standard deviation of 4 ounces. Assume the weights are normally distributed. Suppose a randomly chosen baseball has a weight under 21 ounces. What is the probability that its weight is greater than 15 ounces? Use the appropriate chart to answer the question.

A) $\frac{3806}{3867}$ *B*) $\frac{1072}{1133}$ *C*) $\frac{61}{3867}$ *D*) $\frac{61}{1133}$ *E*) *NOTA*

26. You want to estimate the mean income for a population of engineers with a 90% confidence interval. Assume the population standard deviation is $\sigma = 10000$. If you want the margin of error to be 1500, find the smallest possible sample size needed. Use the appropriate chart to answer the question.

A) 171 B) 170 C) 121 D) 120 E) NOTA

27. 24% of the Peanut M+M's in Ms. O'Brien's candy jar are red. Johnny only likes the red ones. He randomly selects an M+M from the jar. If it is red, he eats it. If it is not red, he puts the M+M back and randomly selects another. Find the probability that it takes Johnny more than four times before he chooses a red M+M.

A) $\frac{130321}{390625}$ *B*) $\frac{781926}{9765625}$ *C*) $\frac{41154}{390625}$ *D*) $\frac{1296}{390625}$ *E*) *NOTA*

28. Given P(A) = .34, P(B) = .76, and events A and B are independent, find $P(A \cup B)$.

A) .2584 B) .8416 C) 1 D) no solution E) NOTA

29. Which of the following statements are true?

I. A change in measurement units will change the affect the value of the correlation coefficient.

II. If the correlation coefficient is equal to 0, then the slope of the regression line is 0.

III. A correlation of -1 indicates a perfect cause and effect relationship between the variables.

A) II and III B) III only C) II only D) I only E) NOTA

30. Given a coefficient of determination between two variables of .81, find the correlation coefficient.

A) 0.90 B) 0.81 C) -0.90 D) -0.81 E) NOTA