

January 2008 Statistics Regional

Unless specified in the question, the answer must be exact. NOTA is “None of the Above”.

1. The Deerfield football stadium has 8000 seats, 4500 on the Deerfield side and the rest on the visitors’ side. For the game last Friday, all seats in the stadium were sold out. 63% of the Deerfield fans bought a bottle of water and 78% of the visiting fans bought a bottle of water. Given that a fan bought a bottle of water, find the probability that the fan was sitting on the Deerfield side.

a) $\frac{26}{53}$ b) $\frac{27}{53}$ c) $\frac{51}{100}$ d) $\frac{1116}{1600}$ e) *NOTA*

2. A new drug was given to a volunteer group of 50 people who had high blood pressure. 35 people from the group had lower blood pressure after taking the drug. What should we conclude about the effectiveness of the drug?

- a) The drug was effective in 70% of the cases.
- b) Since the group knew they were being given the drug, we can conclude nothing.
- c) Since the 50 people were not an simple random sample, we can conclude nothing.
- d) Since there was no control group that received a placebo, we can conclude nothing.
- e) *NOTA*

3. The following are statistics about the sets X and Y: $\bar{X} = 53$, $s_x = 5$, $\bar{Y} = 71$, $s_y = 12$. Given that X and Y are independent, find the mean and the standard deviation of the set (X+Y). The answers are in the form (mean, standard deviation).

a) (62,13) b) (62,17) c) (124,13) d) (124,17) e) *NOTA*

4. Preliminary research shows that 81% of respondents agreed with the statement, “I am confident that my Statistics teacher will help me pass the AP exam.” How many people must be sampled to estimate the true proportion within ± 0.06 with 95% confidence? Answer the question using the appropriate chart.

a) 115 b) 116 c) 164 d) 165 e) *NOTA*

5. Suppose 30% of students at Smith High wear glasses. Mrs. Jones is monitoring the main hallway in between classes. Let X = the number of students that must walk by until Mrs. Jones sees a student wearing glasses. The probability that a student wearing glasses walks by before X = 6 is

a) .882351 b) .83193 c) .07203 d) .050421 e) *NOTA*

6. We want to draw a sample of 5 without replacement from a population of 50 students who have taken the AP Statistics exam. If the students are labeled 01, 02, 03, ..., 50 and the following line is from a random digit table

73676 47150 99400 01927 27754 42648 82425 36290

Which of the following represents the sample of 5, starting from the left?

a) 6, 47, 15, 9, 1 b) 50, 40, 1, 42, 24 c) 50, 40, 19, 27, 44 d) 7, 36, 47, 15, 9 e) *NOTA*

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7. The following information is a summary about a data set of bowling scores from the Okahumpka Bowling League.

$$\bar{x} = 174, s_x = 20, \min x = 110, Q_1 = 132, med = 150, Q_3 = 183, \max x = 250$$

What is the largest integer value for an outlier on the lower end?

- a) 55 b) 81 c) 99 d) 110 e) *NOTA*

8. A research firm wants to find the country's reaction to a speech by a politician running for President. To insure a very narrow confidence interval, they decide to interview 4000 adults. The firm randomly selects 8 states and then selects 10 zip codes at random from each state. Finally, 50 people from each zip code area are selected at random. This method of sampling is

- a) simple random sample b) systematic sample c) stratified sample
d) multi-stage sample e) *NOTA*

9. The coefficient of determination is equal to .64. What is the value of the correlation coefficient?

- a) .4096 b) .64 c) .8 d) $-.8$ e) *NOTA*

10. The mean of Mr. Morris' Algebra exam was 78. Johnny scored an 85 on the exam, which placed him at the 75.8 percentile in the class. Given that the exam scores formed a normal distribution, find the standard deviation of the scores. Use the appropriate chart to answer the question.

- a) 5.306 b) 7 c) 10 d) 13 e) *NOTA*

11. Given the following information about two sets X and Y:

$\bar{X} = 105, s_x = 12, \bar{Y} = 150, s_y = 18, r = .6$, find the equation of the line of best fit in slope intercept form.

- a) $y = \frac{9}{10}x + \frac{111}{2}$ b) $y = \frac{2}{5}x + 45$ c) $y = \frac{9}{10}x - 30$ d) $y = \frac{2}{5}x + 108$ e) *NOTA*

12. Given $P(A) = .6, P(B) = .4, P(A|B) = .8$, find $P(B|A)$.

- a) *no solution* b) 1 c) $\frac{8}{15}$ d) $\frac{7}{15}$ e) *NOTA*

13. In Ms. Lambert's class, 21 students take Math, 20 students take Science and 17 students take History. 10 take Math and Science, 7 take Science and History and 9 take Math and History. 6 students take all three classes and each student takes at least one of the three classes. Find the probability that a student takes at least two classes.

- a) $\frac{4}{19}$ b) $\frac{7}{19}$ c) $\frac{4}{29}$ d) $\frac{7}{29}$ e) *NOTA*

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14. Which of the following is NOT a condition for a chi-square test?

- a) The data must be randomly selected. b) The data must be independent.
c) All expected cell counts must be at least 1. d) No more than 20% of the cells
can have an expected value less than 5. e) NOTA

15. Mr. Carter is looking for more agile athletes for his basketball team. One of his requirements is that his players know how to jump rope. The probability of a student knowing how to jump rope at his school is .35. Six students try out for the team. What is the probability that at least four of the students know how to jump rope?

- a) $\frac{751513}{6400000}$ b) $\frac{1174239}{10000000}$ c) $\frac{285719}{12800000}$ d) $\frac{1217307}{12800000}$ e) *NOTA*

16. An auto mechanic team claims that at a pit stop they can change all four tires and fill the gas tank in 15 seconds. A driver is skeptical of this claim and thinks the team can't be that fast. What are the null and alternative hypotheses that the driver should test?

- a) $H_0: \mu=15, H_a: \mu < 15$ b) $H_0: \mu < 15, H_a: \mu > 15$ c) $H_0: \mu=15, H_a: \mu \neq 15$ d) $H_0: \mu=15, H_a: \mu > 15$ e) *NOTA*

17. Find the mean of the following discrete distribution.

X	2	6	12	18	21
P(X)	.3	.1	.15	.2	.25

a) 11 b) 11.8 c) 11.85 d) 12 e) *NOTA*

18. Find the standard deviation of the following discrete distribution. Round your answer to two decimal places.

X	3	7	9	12	15
P(X)	.2	.16	.2	.12	.32

a) 4.60 b) 4.46 c) 4.12 d) 2.23 e) *NOTA*

19. David has two jars of marbles. Jar A has 5 red marbles and 7 blue marbles. Jar B has 4 red marbles and 9 blue marbles. David randomly chooses two marbles out of Jar A, one at a time and without replacement. He places both of these marbles into Jar B and then randomly chooses a marble from Jar B. Find the probability that the marble David chooses from Jar B is red.

- a) $\frac{463}{1980}$ b) $\frac{248}{495}$ c) $\frac{29}{90}$ d) $\frac{61}{90}$ e) *NOTA*

20. Ms. Lynch gives a Pre Calculus test. The results of the test are a mean of 63 and a standard deviation of 4. She feels the results are too low, so she multiplies everyone's score by 1.5 and then subtracts 9.5 from everyone's score. Find the new mean and standard deviation of the test results. The answers are in the form (mean, standard deviation).

- a) (94.5, 6) b) (85, 3.5) c) (85, 6) d) *no solution* e) *NOTA*

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21. Ujas is taking a statistics class at a local community college. The class grade consists of four categories: projects, quizzes, midterm exam and the final exam. The projects are worth 20% of the grade, quizzes are worth 30% of the grade, the midterm exam is worth 15% and the final exam is worth 35%. Ujas earns a grade of 83 on the projects, 91 on the quizzes and 80 on the midterm exam. He is taking the final exam today. What is the minimum grade Ujas needs to get on the final exam to get an average of 90 for the course?

- a) 97 b) $\frac{682}{7}$ c) 98 d) 99 e) *NOTA*

22. When events A and B are independent, which of the following are true?

- I. $P(A)P(B) = P(A \cap B)$ II. $P(A|B) = P(B)$ III. $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
a) *I only* b) *III only* c) *II and III* d) *I, II, III* e) *NOTA*

23. 34% of students in Mu Alpha Theta are sophomores in high school. 200 members of Mu Alpha Theta are randomly selected to participate in a survey. Find the standard deviation for this situation. Round the standard deviation to three decimal places.

- a) 44.880 b) 11.489 c) 8.246 d) 6.699 e) *NOTA*

24. Which of the following are true statements?

- I. The alternative hypothesis is stated in terms of a population parameter.
II. If a sample is large enough, the necessity for it to be a simple random sample is diminished.
III. If the P-value is .05, the probability that the null hypothesis is correct is .05.
a) *I only* b) *II only* c) *I and II* d) *I, II, III* e) *NOTA*

25. Hayley is bored in Mr. Sleet's Statistics class. She gets out a die and starts rolling. She rolls the die 102 times before Mr. Sleet tells her to stop. The results of her rolls are as follows:

Value	1	2	3	4	5	6
Number of times	13	20	15	12	16	26

Determine the chi-square value if Hayley were to perform a goodness of fit test to determine if the die is fair.

- a) 7 b) $\frac{7497}{1040}$ c) 8 d) 17 e) *NOTA*

26. The Spanish club at Shermer High School is 37% female. The sponsor of the club randomly chooses 150 members. Find the standard deviation of this situation. Round your solution to three decimal places.

- a) 2.145 b) 4.602 c) 5.913 d) 34.965 e) *NOTA*

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The following information is to be used for questions 27 and 28:

The Phillip Shopkin Algebra test is given to all incoming 9th graders to determine their Algebra skills. The possible score on the test ranges from 0 to 50. A random sample of students are selected and they are given the test. The results of the test are as follows:

Gender	Number of students	Mean	Standard deviation
Male	41	28.32	4.91
Female	37	27.13	3.72

27. Using the information above, determine the t-score for the data to help determine if there is a difference between the scores of boys and girls. Assume the difference to be positive. Round the t-score to three decimal places.

- a) .225 b) .981 c) 1.190 d) 1.213 e) *NOTA*

28. Using the information above, determine the degrees of freedom to be used to help determine if there is a difference between the scores of boys and girls. Use the appropriate chart to answer the question.

- a) 36 b) 40 c) 74 d) 77 e) *NOTA*

29. A card is drawn from a standard deck (no jokers). Find the probability that the card is a jack or black.

- a) $\frac{15}{26}$ b) $\frac{6}{13}$ c) $\frac{7}{13}$ d) $\frac{11}{26}$ e) *NOTA*

30. Find the standard deviation of the following set: {2, 6, 12, 17, 23}.

- a) 7.510 b) 8.396 c) $\frac{\sqrt{1410}}{5}$ d) $\frac{\sqrt{282}}{2}$ e) *NOTA*