

2009 Statistics Topic Test

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

1. Which of the following is most useful in establishing cause and effect relationships?

- A) A census B) A simple random sample C) A well designed survey incorporating chance to ensure a representative sample D) A controlled experiment
E) NOTA

2. The weights of wrestlers at Jones High School are normally distributed with a mean of 150 pounds and a standard deviation of 20 pounds. Using the appropriate chart, find the probability that a randomly selected wrestler weighs less than 120 pounds or more than 200 pounds.

- A) .0606 B) .0668 C) .073 D) .927 E) NOTA

3. Suppose that 75% of a simple random sample of 100 students taking a Math class in the morning like Math, while only 62% of a simple random sample of 150 students taking a Math class in the afternoon like Math. Establish a 90% confidence interval estimate for the difference between the two times. Use the appropriate chart to answer the question. Assume a positive difference and round each end of the interval to six decimal places.

- A) (.033438,.226561) B) (.033439,.226561) C) (.054864,.205135) D) (.054864,.205136) E) NOTA

4. Ten people who suffer from allergies volunteer to test a new medication that will relieve the symptoms. The names of the volunteers are:

Volunteer	1	2	3	4	5	6	7	8	9	10
Name	Ann	Bill	Cathy	Dan	Ed	Fran	Greg	Heath	Izzie	Jack

Five of the volunteers will receive the new medication while the other five will receive a placebo as part of an experiment. Starting at the left of the list of random numbers below and reading from left to right, assign five people to be given the medication.

07236 10524 10984 76507 64352 10240 90601 12360 10010 90802

The five people assigned are

- A) Bill, Fran, Greg, Ann, Cathy B) Greg, Jack, Izzie, Fran, Ann
C) Greg, Ed, Jack, Bill, Ann D) Bill, Heath, Jack, Ann, Greg E) NOTA

5. Given the following five number summary for a data set of five numbers:

$minimum = 10$, $Q_1 = 12.5$, $median = 30$, $Q_3 = 52.5$, $maximum = 60$, find the sum of the data set.

- A) 33 B) 150 C) 160 D) 165 E) NOTA

2009 Statistics Topic Test

6. Mr. Scales likes to relax by shooting free throws. His free throw percentage is 82%. Mr. Scales has a long day. Find the probability that it takes Mr. Scales at least four free throws before he makes one, assuming each free throw is independent.

- A) .18 B) .005832 C) .00478224 D) .00104976 E) NOTA

7. A topic studied by the Political Science department at the University of Tennessee was "I will be voting in the 2008 presidential election." Preliminary research showed that 83% of respondents agreed with that statement. Using the appropriate chart, how many people must be sampled to estimate the true proportion within ± 0.03 with 95% confidence?

- A) 603 B) 602 C) 425 D) 424 E) NOTA

8. The results of Mrs. Hiller's Geometry exam form a normal distribution. 2.17% of the scores are greater than 93 and 10.2% of the scores are less than 60. Using the appropriate chart, find the mean of the Geometry exam.

- A) 76.5 B) $\frac{23931}{329}$ C) $\frac{3637}{50}$ D) $\frac{363693}{5000}$ E) *NOTA*

9. Which of the following is not a condition for a chi-square test?

- A) The data must be randomly selected. B) No more than 20% of the cells can have an expected value less than 5. C) The data must be independent. D) All expected cell counts must be at least 1. E) *NOTA*

10. Find the standard deviation of the following data set: 1, 4, 7, 10, 13, 16, 19

- A) 6 B) 6.48 C) $\sqrt{42}$ D) 7 E) *NOTA*

11. If $P(A) = \frac{10}{33}$, $P(B) = \frac{6}{11}$, and $P(A' \cap B') = \frac{11}{20}$, find $P(A|B)$.

- A) $\frac{197}{660}$ B) $\frac{9}{20}$ C) $\frac{13}{40}$ D) $\frac{13}{72}$ E) *NOTA*

12. 38% of students play sports. For a group of 75 students randomly selected, find the standard deviation for the number of students who play sports. Round your solution to two decimal places.

- A) 28.50 B) 17.67 C) 5.34 D) 4.20 E) *NOTA*

2009 Statistics Topic Test

13. Ara is taking AP Statistics in Mr. Frost's class. The class grade is made up of four parts: chapter tests, projects, the midterm exam and the final exam. The percentage worth of each part is 30%, 25%, 20% and 25% respectively. So far, Ara has earned a 93 average on her chapter tests, an 85 average on her projects and an 86 on her midterm exam. What is the minimum score she must earn on the final exam to have an overall average of at least 90?

- A) 94 B) 94.6 C) 95 D) 96 E) NOTA

14. Following are parts of the probability distribution for the random variables X and Y.

X	1	2	3	4	Y	1	2	3
P(X)	.2	.1	???	???	P(Y)	.3	???	???

If X and Y are independent and the joint probabilities $P(X=2, Y=2) = .05$ and $P(X=3, Y=1) = .15$, find $P(X=4, Y=3)$.

- A) .04 B) .06 C) .10 D) .20 E) NOTA

15. A research firm wants to find the country's reaction to the State of the Union address. They decide to interview 8000 registered voters. The firm randomly selects 8 states and then selects 10 zip codes at random from each state. Finally, 100 people from each zip code area are selected at random. This method of sampling is called

- A) simple random sample B) multi-stage sample C) stratified sample
D) systematic sample E) NOTA

Use the following information to answer questions 16 and 17.

In the senior class at Smith High, 40 students take Spanish, 24 take French and 29 take Japanese. 25 students take only Spanish, 12 take only French and 15 take only Japanese. 3 students take all three classes and every senior takes at least one language.

16. What is the total number of seniors at Smith High?

- A) 75 B) 74 C) 71 D) 68 E) NOTA

17. What is the probability that a senior at Smith High takes Spanish, given that the senior is in Japanese?

- A) $\frac{7}{29}$ B) $\frac{8}{29}$ C) $\frac{9}{29}$ D) $\frac{10}{29}$ E) *NOTA*

2009 Statistics Topic Test

18. Abbey is bored in Dr. Sleet's class. She rolls a die 162 times. The results of the rolls are as follows:

Value	1	2	3	4	5	6
Frequency	32	25	20	35	28	22

Abbey performs a χ^2 goodness of fit test to determine if the die is fair. Find the value of χ^2 .

- A) 0 B) $\frac{393741}{61600}$ C) $\frac{31111}{5000}$ D) $\frac{56}{9}$ E) *NOTA*

19. Using the information in question #18, what are the degrees of freedom for the χ^2 test?

- A) 6 B) 5 C) 1 D) 0 E) *NOTA*

20. Which of the following would increase the power of a statistical test?

- I. Increase the significance level. II. Increase the sample size.
III. Shrink the difference between the hypothetical mean and the true mean.

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

21. The random variable X has a mean of 12 and a standard deviation of 3. The random variable Y has a mean of 10 and a standard deviation of 2. Find the mean and standard deviation of the random variable (X-Y). Write your answer in the form (mean, standard deviation).

- A) (1,1) B) $(1, \sqrt{13})$ C) (2,1) D) $(2, \sqrt{13})$ E) *NOTA*

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

X	10	12	14	15	17	18	20
P(X)	.1	.13	.2	.1	.15	.22	.1

- A) 2.97 B) 3.23 C) 3.48 D) 3.49 E) *NOTA*

23. Given the correlation coefficient between sets X and Y is $r = .75$, find the coefficient of determination.

- A) .866 B) .75 C) .5625 D) .375 E) *NOTA*

2009 Statistics Topic Test

24. 30% of students at Jones High drive to school. 40% of the drivers are girls. Boys and girls are equally represented at Jones High. A student is randomly selected. Find the probability that the student is a boy, given that the student does not drive.

- A) $\frac{9}{50}$ B) $\frac{8}{25}$ C) $\frac{16}{35}$ D) $\frac{32}{49}$ E) *NOTA*

25. In a simple random sample of 25 students, their average weight was 143 with a standard deviation of 13.2. Using the appropriate table, find a 90% confidence interval estimate for the average weight of a student. Using the appropriate chart, round each of the endpoints of the interval to three decimal places.

- A) (138.482,147.517) B) (138.483,147.517) C) (138.490,147.509) D) (138.491,147.509) E) *NOTA*

26. Given two sets of data X and Y: $\bar{X} = 53$, $s_x = 5$, $\bar{Y} = 82$, $s_y = 8$, $r = .72$, find the equation of the line of best fit in slope intercept form.

- A) $y = .45x + 16.1$ B) $y = .45x + 58.15$ C) $y = 1.152x - 41.464$ D) $y = 1.152x + 20.944$ E) *NOTA*

27. Troy walks into his AP History class. Mrs. Goetz announces a pop quiz. It is a ten question multiple choice quiz in which each question has four choices. Troy will be guessing on each question. Assuming each guess for each question is independent, find the probability that Troy answers more than three and less than eight questions correct.

- A) $\frac{14661}{65536}$ B) $\frac{223709}{1000000}$ C) $\frac{2237091063}{10000000000}$ D) $\frac{447418213}{2000000000}$ E) *NOTA*

28. A card is drawn from a standard deck (no jokers). Find the probability that the card is black or not a face card.

- A) $\frac{5}{13}$ B) $\frac{8}{13}$ C) $\frac{12}{13}$ D) $\frac{23}{26}$ E) *NOTA*

29. Mr. Nieves gives his English class a test on Kafka. The statistics of the class are a mean of 68 and a standard deviation of 10. Mr. Nieves curves the scores so that the new mean and standard deviation are 75 and 6, respectively. Jennifer scored an 80 on the test. What is her score after the test is curved?

- A) 81 B) 82.2 C) 83 D) 87 E) *NOTA*

2009 Statistics Topic Test

30. A data set has the following statistics: $n = 9$, $\bar{x} = 6$. One of the values in the data set is 10. What numerical contribution did 10 make to the variance of the data set?

- A) $\frac{1}{2}$ B) 1 C) $\frac{16}{9}$ D) 2 E) *NOTA*

Tiebreak Question 1

1. Given the first 100 positive integers, find the probability that a randomly selected integer has an odd number of factors.

Tiebreak Question 2

2. If $P(A) = .35$, $P(B) = .58$, and the events A and B are independent, find $P(A \cup B) - P(A' \cap B')$.

Tiebreak Question 3

3. Mr. Marley gets to work on time 40% of the time. Mr. Marley is counting the number of days until he gets to work on time. Find the standard deviation of this situation.