

TMATYC - Statistics Test – 2012

Instructions for the Answer Sheet

DO NOT BEGIN UNTIL YOU ARE TOLD TO DO SO

To the student:

Complete **all** information on answer sheet. Carefully answer the eligibility questions. You will be disqualified if you take an incorrect test. If you are unsure of your eligibility status, ask your test monitor **NOW**, before starting the test. No questions may be asked once the test begins.

You have one hour to take this test. You are allowed to use a non-symbolic calculator (such as the TI-83, TI-84, or TI-86). Calculators that perform symbolic manipulations are **not** allowed (these include the TI-89, TI-92, or TI-Nspire). Blank scratch paper is allowed. **A set of statistical formulas and tables will be provided.** No books, notes, or any other electronic devices are allowed. Please refrain from using any cell phone during the test. Such devices should be muted or put on silent mode.

There are 25 questions on the test. Each question is worth 4 points for a correct answer, but 1 point will be subtracted for each incorrect answer. There is no penalty for unanswered questions.

You are not expected to answer every question in the time allowed. If you are having difficulty with a question, skip it and, if time permits, return to it after you finish the others.

Place the letter for your choice of the correct response on the answer sheet under the column entitled "Student's Response". **Write your letters in block capital form (i.e. write as A, B, C, OR D).**

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TMATYC - Statistics Test – 2012

Answer Sheet

Name: _____ School: _____

Address: _____

Current Math Class: _____

Math Teacher: _____

	Student's Response	Scorer
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Email: _____

Phone: _____

Have you received a two-year or higher college degree? Yes No

Have you ever been enrolled in a second semester of college-level statistics?

Yes No

For Scorer:

Number Correct = _____

Number Incorrect = _____

Number Blank = _____

Num Correct \times 4 = _____

– Num Incorrect = _____

Score on Test = _____

8. The mode of four numbers is 6 and the median is 7. If the mean is 10, then the range of the four numbers is

- A. 4 B. 14 C. 15 D. 23

9. Tickets numbered 1 to 50 are mixed up and then a ticket is drawn at random. What is the probability that the ticket drawn has a number which is a multiple of 2 or 7?

- A. $\frac{32}{50}$ B. $\frac{29}{50}$ C. $\frac{1}{2}$ D. $\frac{7}{50}$

10. Suppose you have a large number of regular six-sided dice. What is the **minimum** number of dice you would need to roll in order to have better than a $\frac{2}{3}$ chance of at least one 6 appearing?

- A. 5 B. 6 C. 7 D. 8

11. What is the probability that in ten tosses of a fair coin exactly 7 heads are obtained? Round answer to three significant digits if needed.

- A. 0.117 B. 0.143 C. 0.7 D. 0.00684

12. A quiz consists of 6 multiple-choice questions each with 5 possible answers. At least 4 questions must be answered correctly to pass the test. If Sue randomly guesses at all questions, what is the probability she passes the quiz? Round answer to three significant digits if needed.

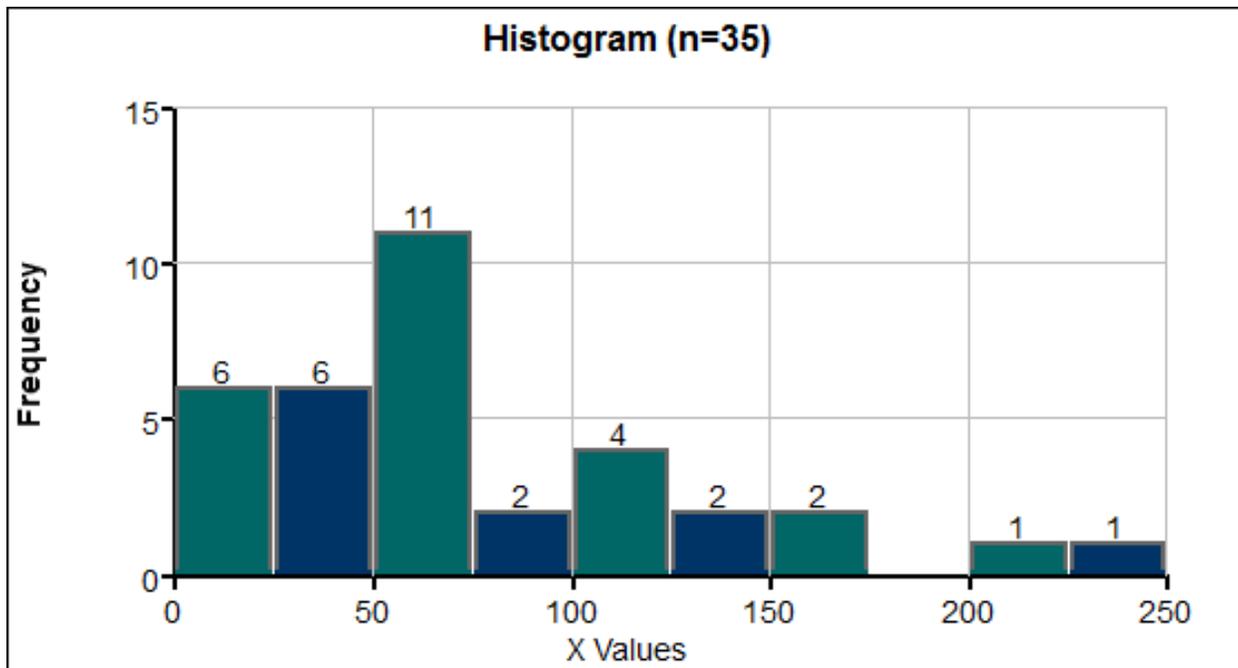
- A. 0.0154 B. 0.0170 C. 0.0016 D. 0.333

13. The random variable X has the probability distribution shown below. What is the mean for this probability distribution?

X	0	1	2	3	4
P(X)	0.21	0.38	0.19	0.14	0.08

- A. 1 B. 1.5 C. 1.75 D. 2

Let X be the budget (in millions of dollars) for a random sample of 35 movies and use the resulting histogram shown below to answer #'s 14-16.



14. How many of the movies have a budget of less than \$100 million?

- A. 35 B. 12 C. 24 D. 25

15. Which of the following values could possibly be the median budget in millions of dollars?

- A. 49 B. 60 C. 85 D. 125

16. The shape of distribution of budget amounts for these movies would best be described as

- A. positively-skewed B. normal C. uniform D. bimodal

17. The scores on an exam are normally distributed with a mean of 70 and a standard deviation of 5. What percent of the scores are between 60 and 85? Round answer to three significant digits.

- A. 0.0215 B. 0.357 C. 0.841 D. 0.976

18. Suppose that X is a normal random variable with mean 100. Let Z be the random variable generated by taking sample means of size $n = 40$. Which of the following inequalities is true?

- A. $P(Z < 99) < P(X < 99) < 0.5$ B. $P(X < 99) < P(Z < 99) < 0.5$
 C. $P(Z < 99) > P(X < 99) > 0.5$ D. $P(X < 99) > P(Z < 99) > 0.5$

19. A pollster samples a population to determine what proportion of the population supports a political candidate. After talking with a sample of 150 adults, he reports the interval (0.68,0.72) to be a 95% confidence interval for the true population proportion p supporting the candidate. Which of the statements below is valid?

- A. There is a 95% chance that p , the true population proportion, is 0.70, the middle of the interval (0.68,0.72).
- B. The 95% confidence level is indicating that there is a 5% chance that the individuals participating in the sample lied when talking to the reporter.
- C. One cannot know with any level of certainty whether or not the specific interval (0.68,0.72) actually contains the true population proportion, p . However, if this process were repeated 100 times, approximately 95 of the constructed intervals would contain p .
- D. We can be 100% sure that the interval (0.68,0.72) contains the population proportion p . However, we can only be 95% sure the interval contains the sample proportion.

20. A researcher randomly samples 200 adult males and finds a 95% confidence interval for the mean weight of adult males (in pounds) to be $174.09 < \mu < 177.91$. Does this interval support the claim that mean weight of adult males is more than 175 pounds?

- A. Yes, there are values in the confidence interval more than 175 pounds.
- B. Yes, more than 95% of adults weigh more than 174.09 pounds, so most must weigh more than 175 pounds.
- C. No, 95% of men weigh between 174.09 and 177.91 pounds, but we can't tell if enough of them weigh more than 175 pounds.
- D. No, there are values in the confidence interval that are less than or equal to 175 pounds.

21. A scientist measures the serum prolactin levels in 50 lab rats. In testing the claim that the mean prolactin level in rats is less than 45 ng/ml, the scientist computes a p-value of 0.067 using this sample data. At the 0.05 significance level, what conclusion should be made?

- A. Reject H_0 , sample data support the claim that the mean is less than 45 ng/ml.
- B. Reject H_0 , sample data does not support the claim that the mean is less than 45 ng/ml.
- C. Fail to reject H_0 , sample data support the claim that the mean is less than 45 ng/ml.
- D. Fail to reject H_0 , sample data does not support the claim that the mean is less than 45 ng/ml.

22. A random sample of forty-five 2012 Honda Accords is used to test the stopping distance (from 70 mph to 0 mph) for this vehicle. The mean stopping distance for this sample was 179 feet with a standard deviation of 16 feet. Compute the value of the test statistic that would be used to test the claim that the mean stopping distance for 2012 Honda Accords is less than 185 feet. Round your value to two decimal places.

- A. -2.52
- B. -1.96
- C. -0.22
- D. 0.37

23. A researcher is interested in whether families living closer to a nuclear power plant experience a higher rate of cancer. After gathering data, he computes the correlation coefficient between these variables to be $r = 0.89$, with a level of significance of 95%. On the basis of this data, which of the following conclusions is true?

- A. 89% of people living close to a nuclear power plant will get cancer.
- B. One can be 95% sure that living close to a nuclear power plant causes cancer.
- C. 95% of people living close to a nuclear power plant will get cancer.
- D. On the basis of this data, it is not possible to draw conclusions about whether or not living close to a nuclear power plant causes cancer.

24. The ages (x), in years, and corresponding weights (y), in pounds, of 7 randomly-selected female children are presented in the table below.

Age:	4	4	5	6	6	7	8
Weight:	61	65	70	78	89	85	90

The regression equation for this data is $y = 35.7 + 7.2x$ while the linear correlation coefficient is $r = 0.918$. Should the regression equation be used to predict the weight of a 17 year-old female? Why or why not.

- A. Use the regression equation since there appears to be linear correlation.
- B. Don't use the regression equation since there does not appear to be linear correlation.
- C. Use the regression equation since we have the regression equation.
- D. Don't use the regression equation since a 17 year-old is not within the scope of the sample data.

25. Two candidates are running for president of a fictitious country. Currently, the rich are 10% of the population and have \$100 total income (between all of them). The poor people are the other 90% of the population and also have \$100 total income (between all of them). Everybody pays 50% tax on their income.

Candidate A proposes a tax cut so that the rich would pay 40% tax on their income, but the poor would pay only 25% tax on their income.

In the presidential debate, Candidate B says, "Candidate A's plan would give back more than three times more money to the average rich person than to the average poor person."

Then, Candidate A responds, "Under my plan the average rich person will pay more than ten times in taxes what the average poor person pays!"

Who is right?

- A. Candidate A is right and Candidate B is wrong
- B. Candidate B is right and Candidate A is wrong
- C. Both candidates are right
- D. Both candidates are wrong