TMATYC - Statistics Test - 2016

1. For the set of data $\{2,5,7,7,8,9,9,9\}$, the mode plus the median equals

    A. 14.5   B. 15   C. 16   D. 16.5   E. 24

2. A numerical measurement describing some characteristic of a population is called a

    A. parameter   B. statistic   C. proportion   D. average   E. census

3. A multiple choice exam is given with four choices (only one of which is correct) for each of twenty questions. What is the expected average percentage correct for a student who guesses randomly?

    A. 100%   B. 75%   C. 37.5%   D. 20%   E. 25%

4. Assume the profit (in thousands of dollars) for concession sales at a community college athletics event follows the Standard Normal Distribution. What is the probability that a profit of more than 2 thousand dollars will be made at such an event? Round to the third decimal place.

    A. 0.023   B. 0.046   C. 0.054   D. 0.108   E. 0.977

5. For the upcoming field trip to the zoo, Ms. Erin needs to choose 5 group leaders from her class of 15 children. How many different combinations of group leaders are possible?

    A. 75   B. 120   C. 3,003   D. 10,800   E. 360,360

6. Oops! Gramps mixed all his pills in one bottle (again!). He put all ten round pills in one bottle. You know the bottle contains five laxatives, two blood pressure pills, and three sleeping pills. Gramps just tried to take two pills before his afternoon nap. You stop him, but what was the probability that he had two of the same pill in his hand?

    A. 0.222   B. 0.022   C. 0.333   D. 0.311   E. 0.067

7. An insurance company examines its pool of auto insurance customers and gathers the following information:

I. All customers have at least one car.
II. 70% of the customers insure more than one car.
III. 20% of the customers insure a sports car.
IV. Of those who insure more than one car, 15% insure a sports car.

Calculate the probability that a randomly selected customer insures **exactly one** car that is **NOT** a sports car.

    A. 0.13   B. 0.205   C. 0.24   D. 0.25   E. 0.30

8. Which of the following statements is **always** true regarding **any** set of quantitative data?

    A. There is one mode.   B. The median is a member of the set.   C. The mean of the set exists.

    D. The range is larger than the mean.   E. The standard deviation is positive.

9. Skylar Grace recently took a standardized test. The mean score for the test was 98, and the standard deviation was 17. When the score report was sent to her teacher Ms. Rita, it only has her z-score of 1.62. What was Skylar Grace's score on the test?

    A. 158.76   B. 70.46   C. 99.62   D. 77.49   E. 125.54

10. A math professor gives a multiple choice basic skills test on the first day of class. There are 25 questions with 5 choices for each question (with only one correct choice per question). What are the high and low boundaries for scores within 2 standard deviations of the mean that the instructor should see from random guesses?

   A. 0 and 25   B. 4 and 6   C. 3 and 7   D. 1 and 9   E. 2 and 5

11. A two variable statistical analysis was conducted and resulted in an r^2 value (or coefficient of determination) of 0.8527. Which of the following statements correctly describes the variation between the independent and dependent variables?

   A. 85.27% of the variation in the independent variable is caused by the dependent variable.
   B. 85.27% of the variation in the dependent variable is caused by the independent variable.
   C. 9.23% of the variation in the independent variable is caused by the dependent variable.
   D. 9.23% of the variation in the dependent variable is caused by the independent variable.
   E. None of these is correct.

12. At its Annual Meeting (themed Viva Nash-Vegas), TMATYC members had the opportunity to play a dice game for free membership. For the bargain price of $5 (which goes to fund scholarships and awards), members could roll a die with the letters T-M-A-T-Y-C on each of the six sides. If you roll an A you receive a lifetime (30 year) membership worth the equivalent value of $250. Rolling the letter C, gets you a 5 year membership worth the equivalent of $50 dollars. If you roll a Y, you get your $5 back. You get nothing if you roll a T or M. What is the expected value (to the nearest cent) for a single roll in this game?

   A. $45.83   B. $46.67   C. $48.33   D. $49.30   E. $51.67

13. A data scientist records a set of five numbers. The set is bimodal with modes that occur at both 7 and 5. The mean for the set is at least 7, and the range is no more than 20. State the interval for possible values of the missing number.

   A. $[5, 25]$ B. $[5, 11]$ C. $[7, 20]$ D. $[11, 25]$ E. $[7, 25]$

14. A statistician at LaDiDa Consulting performed a hypothesis test based upon a normal population with a sample of more than 30 subjects at the $\alpha = 0.1$ level. After evaluating the sample, the statistician determined that the result is statistically significant. Which of the following must be true?

   A. Because the result is significant at $\alpha = 0.1$, it is also significant at the levels $\alpha = 0.05$ and $\alpha = 0.01$.
   B. Because the result is significant at $\alpha = 0.1$, it is **NOT** significant at the levels $\alpha = 0.05$ and $\alpha = 0.01$.
   C. A test statistic can only be significant at one level of α.
   D. The result is significant at $\alpha = 0.1$, but is not for samples of size less than 30.
   E. None of the above statements must be true.

15. A professor recently decided to study if there was a link between class attendance and score on the final exam. Using the following data from one set of students calculate the correlation coefficient between the number of absences and score on final exam (round to the fourth decimal place).

Number of Absences	10	12	2	0	8	5
Score on Final Exam	70	65	96	94	75	82

   A. 0.9807   B. −0.9807   C. 0.9617   D. −0.9617   E. 0.001

16. Scores on a national exam were determined to follow a normal distribution. The mean score on the exam was a 140, and 95% of scores were between 84 and 196. Which of the following is the approximate standard deviation for the scores on the test?

   A. 56   B. 35.2   C. 28.5   D. 21   E. 14.3

17. A lottery game pays $100,000 for matching five numbers from the pool of the set of the first thirty even integers, as well as matching a sixth digit from the set of single digit natural numbers. If entries cost $5, what is your expectation if you purchase one entry?

   A. −$1.67   B. −$4.22   C. −4.93   D. −4.99   E. $999,995

18. Recently an insurance company surveyed 755 policy holders about distracted driving. They asked policy holders if they had received a traffic violation within the past year, and also asked if the policy holder used a cell phone while driving. These results generated the following data:

	Traffic Violation	No Traffic Violation
Cell Phone Used	25	280
No Cell Phone Used	45	405

   Using a statistical testing method, determine which of the following statements regarding the independence of the variables (cell phone use and receiving a traffic violation) is true at the $\alpha = 0.05$ significance level.

   A. There is not sufficient information to test the variables for independence.

   B. Based on a χ^2 test for independence the test statistic is less than the critical value, and therefore the variables are dependent.

   C. Based on a χ^2 test for independence the test statistic is less than the critical value, and therefore the variables are independent.

   D. Based on a two proportion test using the Standard Normal Distribution, the two proportions appear to be different.

   E. Based on the Pearson Correlation Coefficient, the two pairs of data generate a correlation coefficient close to 1, and therefore the data is highly related and dependent.

19. Elmo gets a new job in Cookie Monster's Bake Shop, but it's not long before Cookie Monster starts to notice a problem: Elmo is always covered in crumbs and cookies are missing. Cookie Monster starts a sophisticated cookie counting system at the advice of the Count, and makes the following observations of "missing cookies" over a 30-day period:

3	2	3	1	4	0	1	2	3	2	1	2	3	1	2
2	3	4	3	2	1	2	2	1	0	2	3	1	3	1

   Using the above information, construct a 95% confidence interval for the number of cookies that Cookie suspects Elmo may be taking without permission. (Round answers to 2 decimal places)

   A. $(1.64, 2.36)$ B. $(1.61, 2.39)$ C. $(1.70, 2.30)$

   D. $(1.67, 2.33)$ E. $(1.47, 2.53)$

20. A family takes a vacation to Great Britain, and decide to ride on the famous "Tube." The wait times at a particular station are uniformly distributed between 0 and 10 minutes. What is the probability that the family will wait less than 2.5 minutes or more than 8.5 minutes for a train at this station?

   A. 0.25   B. 0.15   C. 0.40   D. 0.60   E. 0.10

21. While studying on the Enchanted Quad, there is a 50% chance of seeing a fairy. There is also a 42% chance of seeing a unicorn. Oddly, there is also a 25% chance of seeing neither. What is the chance that you see both a fairy and a unicorn while studying on the quad?

   A. 17%   B. 21%   C. 58%   D. 75%   E. 92%

22. Which of the following does not represent an error in data processing due to poor interpretation of results?

   A. A recent study of Jimmy Buffett fans has revealed that they believe that cheeseburgers cause happiness.

   B. A recent independent salary survey of professors used average total income reported nationally to test a local mean.

   C. A financial analyst used a linear regression study to predict the price of a stock that has been undergoing a number of extreme positive and negative price changes.

   D. Parents notice that college tuition is going up at a steady rate each year. They decide to use linear regression to estimate tuition for the years of their child's enrollment based of previous data.

   E. A small community notices that each spring storks fly over the town, and then many women have to go to the hospital to have babies. This is because storks deliver babies.

23. The PGA (Professional Golf Association) requires that all golf balls used in tournament play have a diameter of 1.68 inches. The following measurements were recorded from a set of tournament play balls:

1.683	1.686	1.684	1.685	1.677	1.684
1.682	1.677	1.681	1.686	1.673	1.674

Using a one sample t-test, the following is obtained from statistical software:

$$\bar{x} = 1.681 \quad s = 0.00461 \quad \text{Test statistic: } 0.7511 \quad \text{P-value: } 0.4684$$

Using the level of significance $\alpha = 0.01$, what should happen with the set of balls?

   A. The mean is significantly different from the required value, therefore the set should be rejected.
   B. The mean is significantly different from the required value, therefore the set should **not** be rejected.
   C. The mean is **not** significantly different from the required value, therefore the set should be rejected.
   D. The mean is **not** significantly different from the required value, therefore the set should **not** be rejected.
   E. The standard deviation is close to zero, so the set should **not** be rejected.

24. A research group recently conducted a survey of 85 in-state colleges to determine the costs of room and board (living and eating on campus). The data was classified in the following frequency chart below:

Cost (in dollars per semester)	Frequency
3,000 - 3,999	5
4,000 - 4,999	6
5,000 - 5,999	18
6,000 - 6,999	24
7,000 - 7,999	19
8,000 - 8,999	8
9,000 - 9,999	5

You are looking to transfer to MLPU at the end of this semester, where they claim to have average room and board costs in the 65th percentile for reside-on-campus programs in the state. What should you expect to pay for room and board per semester at MLPU?

A. $4,000 - $4,999   B. $5,000 - $5,999   C. $6,000 - $6,999   D. $7,000 - $7,999   E. $8,000 - $8,999

25. Your favorite brand of gummy bears states that it offers a money back guarantee for packages that fail to meet that promised blend of gummies. The promised blend is:

35% green gummies   25% yellow gummies   25% red gummies   15% white gummies

While eating your pack of gummies you notice a seemingly low number of green gummies. There were 60 gummies in your package. You observed the following: 10 green gummies; 13 red gummies; 20 yellow gummies; and 17 white gummies. How would you efficiently test to see if indeed your package of gummy bears was eligible for a refund?

A. Student t-Test   B. Chi Square Test   C. Linear Regression Test

D. Chebyshev Test   E. Augmented Dickey-Fuller Test