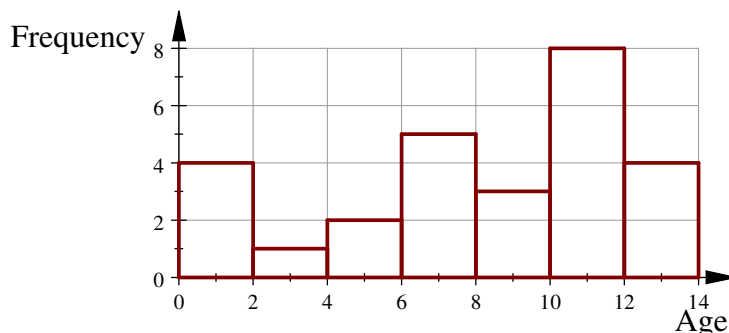


TMATYC - Statistics Test - 2017

- You are asked to find out how high school math teachers feel about calculators. In order to collect your data, you get a list of all the high schools in the United States, randomly choose 500 high schools from this list, and then have every math teacher in each of those schools fill out your questionnaire. What kind of sampling have you done?
 A. Simple random B. Convenience C. Stratified D. Systematic E. Cluster
- Find the outliers in the following 5 number summary: Min = 1, $Q_1 = 5$, Median = 7, $Q_3 = 8$, Max = 13? Use the definition of an outlier as any data point more than 1.5 interquartile ranges (IQRs) below the first quartile or above the third quartile.
 A. None B. The Min and Max C. The Max and Q_3 D. The Min only E. The Max only
- A difficult Physics test has a mean of 53 and the standard deviation of 12. If we decided that anyone who had a z-score of 1.5 or higher got an A, what would be the minimum score you would need to get on the test in order to get an A?
 A. 65 B. 71 C. 75 D. 77 E. 90
- A school district took a random sample of 25 households and collected the age of the youngest child living in each household. The results are displayed in the given histogram. Which class will contain the Median?



- A. 4 up to 6 yrs old B. 6 up to 8 yrs old C. 8 up to 10 yrs old

D. 10 up to 12 yrs old E. 12 up to 14 yrs old
- The time the bus you take to school arrives at your stop is normally distributed with a mean of 8:00am and a standard deviation of 2 minutes. You show up at your stop every day at 7:56am. If the bus is more than 6 minutes late you will not have time to get your morning coffee. Using the empirical rule for bell-shaped data, what percent of days will you catch your bus and have time to get coffee?
 A. 0.15% B. 2.5% C. 95% D. 97.35% E. 99.7%
- The average height for an adult male is 69.1 inches with a standard deviation of 2.9 inches. Yao Ming the basketball player is 7'6". Compute the z-score for his height.
 A. 2.38 B. 2.62 C. 5.83 D. 7.21 E. 21.2

7. You flip a coin five times. Which of the following describes two disjoint events?
- A. The first three flips are heads; the second flip is tails.
 - B. You get three heads and two tails; the first flip was tails.
 - C. Heads occurs on the third flip; the fourth flip is tails.
 - D. You get two heads; you get two tails.
 - E. The first two flips are tails; the last three flips are heads.
8. My older son has 20 red marbles, 25 green marbles, 10 pink marbles, and 15 purple marbles. If he chooses a marble at random to give to his younger brother, what is the probability that it is purple or pink?
- A. $\frac{1}{7}$ B. $\frac{5}{14}$ C. $\frac{3}{14}$ D. $\frac{4}{7}$ E. $\frac{25}{71}$
9. Statistics show that 75% of men and 90% of women wash their hands after using a public restroom. While eating at the local restaurant, you head off to the bathroom. On your way you observe a man and a woman each come out of their respective bathrooms. What is probability that at least one of them washed their hands?
- A. 65% B. 67.5% C. 82.5% D. 93.25% E. 97.5%
10. A school district uses an IQ test where scores are normally distributed and have a mean of 100 and a standard deviation of 15. If a child scores at the 72nd percentile, their IQ is closest to
- A. 107 B. 109 C. 111 D. 113 E. 115
11. Suppose that 2% of all people have the gene DXB. A test is developed to detect the gene DXB that is 95% accurate. This means that if you have the DXB gene, 95% of the time the test will be positive, and 5% of the time it will be negative. Similarly if you do not have the gene, 95% of the time it will say negative and 5% of the time it will say positive. If we tested the whole population for this gene, what percent would test positive for the gene DXB?
- A. 1.9% B. 2% C. 5% D. 6.8% E. 95%
12. You are only taking this test because your teacher is bribing you with free pizza. You decide to guess on every question. What is the probability that you get 11 problems correct? In case you are not paying attention, there are 25 questions, and each question has 5 answer choices.
- A. 0.004 B. 0.019 C. 0.133 D. 0.2 E. 0.44
13. You have 8 Hawaiian shirts and 7 pastel pairs of shorts. You are going to go on vacation for 4 days, so you need to pack 4 of the Hawaiian shirts and 4 of the pastel shorts. How many different ways could you choose what to take with you?
- A. 16 B. 56 C. 224 D. 2,450 E. 6,435

14. The table below summarizes the results when a random sample of adults were asked their favorite color.

	Red	Green	Blue	Other	Total
Under 30	20	42	16	36	114
30 - 50	24	35	24	25	108
Over 50	25	22	35	10	92
Total	69	99	75	71	314

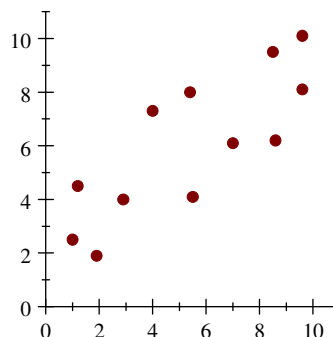
If a person whose favorite color is green is randomly chosen, what is the probability that they are in the 30 to 50 age group? Round to the nearest thousandth.

- A. 0.111 B. 0.315 C. 0.324 D. 0.344 E. 0.354
15. If your data is heavily skewed to the right, which of the following is the best choice as your measure of center?
 A. Standard deviation B. Mean C. Median D. Range E. Midrange
16. A high school football team is doing the following as a fundraiser. They will sell 1000 tickets at \$4 each, and then give away four \$200 prizes and one \$1000 prize. What is the expected value if you buy one of these tickets?
 A. -\$2.20 B. -\$2.18 C. -\$1.80 D. \$1.80 E. \$2.18
17. The students at a large university have SAT scores that are normally distributed with a mean of 500 and a standard deviation of 100. If you randomly sample 25 of those students, what is the probability that their average is above 550?
 A. 0.006 B. 0.106 C. 0.159 D. 0.250 E. 0.309
18. The table below shows the fat and calorie content for a single serving of seven different cereals:

Fat (grams)	5	2	2	1	0	1	3
Calories	120	110	130	90	100	140	150

Using the least squares regression line for this data, find the residual for the cereal that has 5 grams of fat.

- A. -15 B. -5 C. 0 D. 5 E. 25
19. For the scatterplot below, the best estimate of the correlation coefficient is



- A. -0.85 B. -0.16 C. 0 D. 0.82 E. 1

20. The 95% confidence interval for the mean number of complaints a city receives about garbage pickup per day is (14.7, 18.9). This interval was computed using the number of complaints received on 30 randomly chosen days during the past year. What was the sample standard deviation for these 30 days?
- A. 16.2 B. 8.65 C. 5.62 D. 4.31 E. Cannot be determined from the information given.
21. In a random sample of 40 students at a school, 25 are wearing sneakers. Find the margin of error for the 95% confidence interval for the percentage of all students at that school who are wearing sneakers. Round to the nearest tenth of a percent.
- A. 62.5% B. 31.3% C. 30.0% D. 15.0% E. 7.5%
22. If all else remains the same, which of these will make a confidence interval for a proportion wider?
- I. Increase the confidence level.
 II. Increase the sample size.
 III. Increase the margin of error.
- A. I only B. II only C. I and II only D. II and III only E. I and III only
23. A new drug has been developed to prevent hair loss. Suppose it is your job to test the null hypothesis that the drug does NOT prevent hair loss. Under which of the following conditions would a Type I error occur?
- A. If you conclude that the drug does not prevent hair loss, but it actually does.
 B. If you conclude that the drug prevents hair loss, and it actually does.
 C. If you conclude that the drug does not prevent hair loss, and it actually does not.
 D. If you conclude that the drug prevents hair loss, but it actually does not.
 E. Only Type II errors can happen for this type of test.
24. In 2008, according to official sources, green M&Ms made up on average 16% of each pack. The candy maker now no longer gives an official percentage, so you decide to test if the percentage of green M&Ms is now different than it was in 2008. You collect 200 pieces of M&Ms and find that 42 of them are green. Compute the test statistic for this test.
- A. 0.03 B. 0.05 C. 0.21 D. 1.65 E. 1.93
25. Aldrin is a highly toxic organic compound that can cause birth defects. Ten samples are taken from a river that is downstream from a toxic waste site and the aldrin concentrations, in nanograms per liter, for each sample are:
- 5.17 6.17 6.26 4.26 3.17 3.76 4.76 4.90 6.57 5.17
- Government regulations state that concentrations must be below 4.15 nanograms per liter. If we perform the following hypothesis test for the mean Aldrin concentration, in what range is the p-value?
- $H_0: \mu = 4.15$ $H_1: \mu > 4.15$
- A. 0.005 to 0.01 B. 0.01 to 0.025 C. 0.025 to 0.05 D. 0.05 to 0.1 E. 0.1 to 0.2