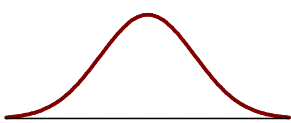


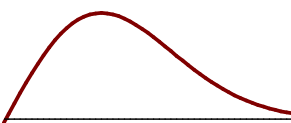
### TMATYC - Statistics Test - 2018

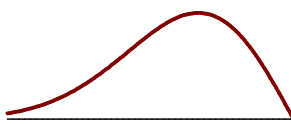
- In order to gauge public opinion about the candidates in the recent election for Governor of Tennessee, the Tennessean conducted telephone interviews with 1,078 people who were registered to vote in Tennessee. The population for this poll is the
  - adults who live in Tennessee
  - people who were called and interviewed in the poll
  - registered voters in Tennessee
  - registered voters in the U.S.
  - candidates for Governor of Tennessee
- In a sample of 286 people, there are 20% more females than males. How many females are in the sample?
  - 57
  - 145
  - 156
  - 200
  - 229
- Consider the frequency table for scores on a test given below.


Score	Frequency	Score	Frequency
41-45	1	71-75	19
46-50	2	76-80	23
51-55	4	81-85	24
56-60	7	86-90	23
61-65	11	91-95	16
66-70	15	96-100	3


Which of the following would most likely be an outline for the corresponding histogram?

- A. 

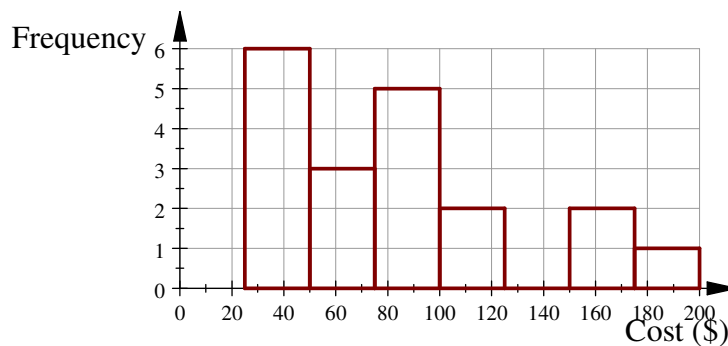
B. 

C. 

D. 

E. 

- The following histogram shows the cost (in dollars) of repairing push lawn mowers at a local hardware store for the past month.



What is the probability that one randomly selected lawn mower repair from the past month is at least \$100?

- $\frac{5}{19}$
- $\frac{14}{19}$
- $\frac{2}{19}$
- $\frac{1}{3}$
- $\frac{2}{15}$

5. Let  $x$  and  $y$  each represent unique numbers such that  $x < y < 15$ . Then the set of four numbers  $\{x, x, y, 15\}$  obviously has a mode of  $x$ . If this mode is three less than the mean of these numbers and the median is 9, find the value of  $y - x$ .
- A. 10      B. 8      C. 6      D. 4      E. 2
6. A set of numerical data has a mean of 10 and a range of 0. What is the mode,  $m$ , and standard deviation,  $s$ , for this set of data?
- A.  $m = 10, s = 0$    B.  $m = 10, s = 10$    C.  $m = 0, s = 0$    D.  $m = 0, s = 10$    E. Cannot be determined
7. Your results on a standardized test indicate that you scored in the 80th percentile. This means that
- A. you answered 80% of the questions on the test correctly.  
 B. you scored about the same as 80% of people taking the test.  
 C. you scored higher than 80% of the people taking the test.  
 D. you scored less than 80% of the people taking the test.  
 E. your test was the 80th one graded out of all people taking the test.

Use the data in the table below to answer questions 8, 9 and 10.

Results of a General Knowledge Test

	Freshman	Sophomore	Junior	Senior
Pass	25	30	70	60
Fail	65	70	45	35

8. If one student who took the general knowledge test is randomly selected, what is the probability they are a sophomore or failed the test?
- A.  $\frac{1}{400}$       B.  $\frac{70}{100}$       C.  $\frac{70}{400}$       D.  $\frac{245}{400}$       E.  $\frac{315}{400}$
9. If one student who took the general knowledge test is randomly selected, what is the probability they passed the test given that they were a junior?
- A.  $\frac{70}{115}$       B.  $\frac{70}{185}$       C.  $\frac{70}{400}$       D.  $\frac{255}{400}$       E.  $\frac{325}{400}$
10. If two students who took the general knowledge test are randomly selected without replacement, what is the probability that both were seniors?
- A.  $\frac{2}{95}$       B.  $\frac{95}{400}$       C.  $\frac{190}{400}$       D.  $\frac{21}{1600}$       E.  $\frac{47}{840}$
11. Each letter in TMATYC is written on a separate  $3 \times 5$  notecard. If the cards are scrambled up and one is randomly selected, what is the probability of not drawing the letter T?
- A.  $\frac{4}{5}$       B.  $\frac{1}{5}$       C.  $\frac{1}{3}$       D.  $\frac{2}{3}$       E.  $\frac{1}{6}$
12. Let  $x$  be the number rolled on a fair six-sided die. What is the standard deviation of the probability distribution for  $x$ ? Round answer to the nearest tenth.
- A. 1.7      B. 1.9      C. 2.9      D. 3.5      E. 6.0

13. Let  $x$  be a random variable. What is the missing probability value,  $P(x)$ , in the probability distribution for  $x$  shown below?

$x$	0	1	2	3	4
$P(x)$	0.05	0.1		0.2	0.25

- A. 0.05      B. 0.1      C. 0.15      D. 0.2      E. 0.4
14. Which of the following **MUST ALWAYS** be true for a discrete probability function,  $f(x)$ ?
- A.  $f(x) = 1$  for all  $x$       B.  $0 \leq f(x) \leq 0.5$  for all  $x$       C.  $0.5 \leq f(x) \leq 1$  for all  $x$   
D.  $\sum f(x) = 0$       E.  $\sum f(x) = 1$
15. Which of the following statements concerning linear correlation are true?
- I. A linear correlation coefficient of 0 indicates no linear correlation  
II. A linear correlation coefficient of 1 indicates strong linear correlation  
III. Strong linear correlation always indicates a cause and effect relationship between the variables
- A. I only      B. II only      C. III only      D. I and II only      E. I and III only
16. A certain type of power generator has an error 5% of the time. If three such generators are used, what is the probability at least one is error-free?
- A. 85%      B. 90%      C. 95%      D. 99.9875%      E. 99.9995%
17. A fair coin is tossed 10 times. What is the probability that you get four heads in those ten tosses? Round to nearest tenth of a percent, if needed.
- A. 18.7%      B. 20.5%      C. 33.3%      D. 40%      E. 46%
18. The scores on a test are normally distributed with a mean of 80 and a standard deviation of 10. What percent of tests had scores more than 70? Round answer to nearest thousandth.
- A. 0.159      B. 0.642      C. 0.841      D. 0.905      E. 0.995
19. The height of an adult male,  $x$ , is normally distributed with a mean of 69.1 inches and a standard deviation of 2.9 inches. A random sample of 100 adult males is obtained and the sample mean height,  $\bar{x}$ , is computed. Which of the following statements **must** be true?
- A.  $P(x < 70) < P(\bar{x} < 70)$       B.  $P(x < 70) > P(\bar{x} < 70)$       C.  $P(x < 70) < 0.5$   
D.  $P(\bar{x} < 70) < 0.5$       E.  $\bar{x} = 69.1$
20. You want to construct a 95% confidence interval for the proportion of U.S. households without a landline phone. Assuming you have no prior information suggesting a possible value of  $p$ , what is the approximate minimum sample size needed to estimate the percentage with a margin of error of 3%?
- A. 545      B. 953      C. 1,068      D. 4,268      E. Cannot be determined from the information given.

21. The heights, in feet, of 8 randomly selected mature dogwood trees are given below.

23.5      25      25      26.5      27      29      29      30.5

Assuming the heights of mature dogwood trees are normally distributed, construct the 95% confidence interval for the mean height,  $\mu$ , of mature dogwood trees using this data.

- A.  $22.8 \text{ ft} < \mu < 31.1 \text{ ft}$       B.  $23.5 \text{ ft} < \mu < 30.4 \text{ ft}$       C.  $24.9 \text{ ft} < \mu < 29.0 \text{ ft}$   
 D.  $25.7 \text{ ft} < \mu < 28.2 \text{ ft}$       E.  $26.4 \text{ ft} < \mu < 27.5 \text{ ft}$

22. From a random sample of 1,000 college freshmen, a 95% confidence interval for the mean,  $\mu$ , number of credit hours taken by full-time freshmen during their first semester is found to be  $11.5 < \mu < 14.5$ . Which statement below best interprets this confidence interval?

- A. About 95% of full-time freshmen take between 11.5 to 14.5 credit hours their first semester.  
 B. We are 95% confident that the interval from 11.5 to 14.5 credit hours contains the sample mean for credit hours taken by the 1,000 students.  
 C. We are 95% confident that the interval from 11.5 to 14.5 credit hours actually does contain the true value of  $\mu$ .  
 D. About 950 of the students sampled took between 11.5 to 14.5 credit hours their first semester as a freshman.  
 E. There is a 95% chance that between 11.5 and 14.5 students in this sample were full-time their first semester as a freshman.

23. In a study of the effectiveness of blood pressure medication,  $n = 20$  subjects are in the control group. After a week of using the medicine, each subject's systolic blood pressure (in mm Hg) is obtained. The data is used to test the claim that the subjects in the control group have a mean systolic blood pressure less than 120 mm Hg. The results for this T-test are summarized below. If a significance level of 0.01 is used, what is the conclusion about this claim?

$n$	$\bar{x}$	$s$	Test Statistic	P-value
20	118.7	9.3	-0.625	0.270

- A. There is enough evidence to support the claim      B. There is not enough evidence to support the claim  
 C. There is enough evidence to reject the claim      D. There is not enough evidence to reject the claim  
 E. There is not enough evidence to be able to address the claim

24. Suppose you are using a significance level of  $\alpha = 0.05$  to test the claim that the population proportion,  $p$ , is less than 0.5. If your sample is a simple random sample of size  $n = 2500$ , which of the following is the approximate **smallest** possible value of  $\hat{p}$ , the sample proportion, for which you will **not** reject the null hypothesis?

- A.  $\hat{p} = 0.44125$       B.  $\hat{p} = 0.45$       C.  $\hat{p} = 0.46775$       D.  $\hat{p} = 0.48355$       E.  $\hat{p} = 0.495$

25. The probability density function for the random variable  $x$  is given by

$$P(x) = \begin{cases} 0 & \text{if } |x| > 1 \\ 1 - |x| & \text{if } -1 \leq x \leq 1 \end{cases}$$

Find  $P(0 \leq x \leq 0.5)$ .

- A. 0      B. 0.125      C. 0.375      D. 0.5      E. 1