Solve the following multiple-choice problems and write the answers (using a pen) on a separate sheet. Please write your name and the word “Stat” on the sheet. (Each problem is worth 2 points)

1. What is the difference between a sample mean and the population mean called?
   (a) Standard error of the mean
   (b) Sampling error
   (c) Interval estimate
   (d) Point estimate

2. All possible samples of size n are selected from a population and the mean of each sample is determined. What is the mean of the sample means?
   (a) The population mean divided by the standard deviation of the population
   (b) The population mean divided by the sample size minus 1
   (c) Exactly the same as the population mean
   (d) Cannot be determined in advance

3. As the size of the sample increases, what happens to the shape of the sampling means?
   (a) Becomes more similar to the population’s distribution
   (b) Approaches a normal distribution
   (c) Cannot be predicted in advance
   (d) Becomes positively skewed

4. Manufacturers were subdivided into groups by volume of sales. Those with more than $100 million in sales were classified as Class A; those from $50 up to $100 million as Class B; and so on. Samples were then selected from each of these groups. What is this type of sampling called?
   (a) Stratified random
   (b) Simple random
   (c) Systematic
   (d) Cluster

5. Suppose a research firm conducted a survey to determine the average amount of money steady smokers spend on cigarettes during a week. A sample of 100 steady smokers revealed that the sample mean is $20 and the sample standard deviation is $5. What is the probability that a sample of 100 steady smokers spend between $19 and $21?
   (a) 0.16
   (b) 0.48
   (c) 0.95
   (d) 0.98
6. The mean number of travel days per year for the outside salespeople employed by hardware distributors is to be estimated. The 0.90 degrees of confidence is to be used. The mean of a small pilot study was 150 days, with a standard deviation of 14 days. If the population mean is to be estimated within two days, how many outside salespeople should be sampled?

(a) 133
(b) 188
(c) 452
(d) 511

7. The mean weight of trucks traveling on a particular section of I-475 is not known. A state highway inspector needs an estimate of the mean. He selects a random sample of 49 trucks passing the weighing station and finds the mean is 15.8 tons, with a standard deviation of the sample of 3.8 tons. What is the 95 percent interval for the population mean?

(a) 13.2 and 17.6
(b) 10.0 and 20.0
(c) 16.1 and 18.7
(d) 14.7 and 16.9

8. Mileage tests were conducted on a randomly selected sample of 100 newly developed automobile tires. The average tread life was found to be 50,000 miles with a standard deviation of 3,500 miles. What is the best estimate of the average tread life in miles for the entire population of these tires?

(a) 50,000
(b) 46,500
(c) 500
(d) 14.29

9. How does the $t$ distribution differ from the standard $z$ distribution?

(a) It is a continuous and asymptotic distribution
(b) It is really a family of distributions
(c) It is bell-shaped
(d) It is symmetrical

10. Suppose 1,600 of 2,000 registered voters sampled said they planned to vote for the Republican candidate for president. Using the 0.95 degree of confidence, what is the interval estimate for the population proportion (to the nearest tenth of a percent)?

(a) 78.2% to 81.8%
(b) 69.2% to 86.4%
(c) 76.5% to 83.5%
(d) 77.7% to 82.3%
11. **What is true about the critical value using the t-distribution?**

(a) The larger the sample size the larger the critical value
(b) The larger the population size the larger the critical value
(c) The larger the level of significance the larger the critical value
(d) The larger the level of confidence the larger the critical value

12. **If the level of confidence is 90% what is the probability of making a Type I error for a sample with 15 observations?**

(a) 6%
(b) 10%
(c) 90%
(d) 95%

13. **A machine is set to fill the small size packages of M&M candies with 56 candies per bag. A sample revealed: 3 bags of 56, 2 bags of 57, 1 bag of 55, and 2 bags of 58 and is compared to the population mean of 57 M & Ms. How many degrees of freedom are there?**

(a) 9
(b) 8
(c) 7
(d) 6

14. **What is the critical value for a one-tailed hypothesis test in which a null hypothesis is tested at the 5% level of significance based on a sample size of 25?**

(a) 1.708
(b) 1.711
(c) 2.060
(d) 2.064

15. **What is a Type II error?**

(a) Accepting a false null hypothesis
(b) Rejecting a false null hypothesis
(c) Accepting a false alternate hypothesis
(d) Rejecting a false alternate hypothesis

16. **Test at the 0.01 level the statement that 55% of those families who plan to purchase a vacation residence in Florida want a condominium. The null hypothesis is \( \pi = 0.55 \) and the alternate is \( \pi \neq 0.55 \). A random sample of 400 families who planned to buy a vacation residence revealed that 228 families want a condominium. What decision should be made regarding the null hypothesis?**

(a) Cannot accept nor reject it based on the information given
(b) Do not reject it
(c) Reject it
(d) None of the above
17. Administering the same test to a group of 15 students and a second group of 15 students to see which group scores higher is an example of
(a) A one-sample test of means
(b) A two-sample test of means
(c) A test of sample proportions
(d) A paired t-test

The results of a mathematics placement exam at Mercy College for two campuses is as follows:

<table>
<thead>
<tr>
<th>Campus</th>
<th>Number</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>330</td>
<td>33</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>310</td>
<td>31</td>
<td>7</td>
</tr>
</tbody>
</table>

18. What is the null hypothesis if we want to test the hypothesis that the mean score on Campus 1 is higher than on Campus 2?
(a) $\mu_1 = \mu_2$
(b) $\mu_1 < \mu_2$
(c) $\mu_1 \leq \mu_2$
(d) $\mu_1 > \mu_2$

19. What is the computed value of the test statistic?
(a) 9.3
(b) 2.6
(c) 3.4
(d) 1.9

20. What is your conclusion with a 95% level of confidence?
(a) Reject the null hypothesis
(b) Do not reject the null hypothesis
(c) Reject the alternate hypothesis
(d) There isn’t enough information to draw any conclusions