Miami Dade College  
QMB 2100 Basic Business Statistics – Fall 2014  
Practice Test #3

1. A research firm needs to estimate within 3% the proportion of junior executives leaving large manufacturing companies within three years. A 0.95 degree of confidence is to be used. Several years ago, a study revealed that 21% of junior executives left their company within three years. To update this study, how many junior executives should be surveyed?

A. 594  
B. 612  
C. 709  
D. 897

2. 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 population mean. He selects and weighs a random sample of 49 trucks and finds the mean weight is 15.8 tons. The population standard deviation is 3.8 tons. What is the 95% confidence interval for the population mean?

A. 14.7 and 16.9  
B. 13.2 and 17.6  
C. 10.0 and 20.0  
D. 16.1 and 18.1

3. What kind of distribution is the t distribution?

A. Continuous  
B. Discrete  
C. Subjective  
D. A z distribution

4. A survey of an urban university (population of 25,450) showed that 870 of 1,100 students sampled supported a fee increase to fund improvements to the student recreation center. Using the 95% level of confidence, what is the confidence interval for the proportion of students supporting the fee increase?

A. [0.767, 0.815]  
B. [0.759, 0.822]  
C. [0.771, 0.811]  
D. [0.714, 0.866]
5. A sample standard deviation is the best point estimate of the ___________.
   A. population range
   B. population skewness
   C. population mode
   D. population standard deviation

6. The distribution of Student's $t$ has _________.
   A. a mean of zero and a standard deviation of one
   B. a mean of one and a standard deviation of one
   C. a mean of zero and a standard deviation that depends on the sample size
   D. a mean that depends on the sample size and a standard deviation of one

7. A group of statistics students decided to conduct a survey at their university to find the average (mean) amount of time students spent studying per week. Assuming a population standard deviation of six hours, what is the required sample size if the error should be less than a half hour with a 95% level of confidence?
   A. 554
   B. 130
   C. 35
   D. 393

8. A group of statistics students decided to conduct a survey at their university to find the average (mean) amount of time students spent studying per week. They sampled 240 students and found a mean of 22.3 hours per week. Assuming a population standard deviation of six hours, what is the 99% level of confidence?
   A. [21.80, 22.80]
   B. [16.3, 28.3]
   C. [21.30, 23.30]
   D. [20.22, 22.0]
9. A survey of households in a small town showed that in 850 of 1,200 sampled households, at least one member attended a town meeting during the year. Using the 99% level of confidence, what is the confidence interval for the proportion of households represented at a town meeting?

A. [0.674, 0.742]
B. [0.655, 0.705]
C. [0.665, 0.694]
D. [0.679, 0.680]

10. A sample of 500 students is selected from a known population of 15,000 students to construct a 99% confidence interval for the average SAT score. What correction factor should be used to compute the standard error?

A. 0.9499
B. 0.9832
C. 2.5760
D. Cannot be determined

11. A manufacturer wants to increase the shelf life of a line of cake mixes. Past records indicate that the average shelf life of the mix is 216 days. After a revised mix has been developed, a sample of nine boxes of cake mix gave these shelf lives (in days): 215, 217, 218, 219, 216, 217, 217, 218, and 218. Using \( \alpha = 0.025 \), has the shelf life of the cake mix increased?

Note: Compute only the mean of the sample. The standard deviation is \( s = 1.20 \)

A. Yes, because computed \( t \) is greater than the critical value.
B. Yes, because computed \( t \) is less than the critical value.
C. No, because computed \( t \) lies in the region of acceptance.
D. No, because 217.24 is quite close to 216.

12. To conduct a test of hypothesis with a small sample, we make an assumption that __________.

A. A larger computed value of \( t \) will be needed to reject the null hypothesis
B. The region of acceptance will be wider than for large samples
C. The confidence interval will be wider than for large samples
D. The population is normally distributed
13. What is a Type II error?
   A. Failing to reject a false null hypothesis
   B. Rejecting a false null hypothesis
   C. Accepting a false alternate hypothesis
   D. Rejecting a false alternate hypothesis

14. What are the critical values for a two-tailed test with a 0.01 level of significance when n is large and the population standard deviation is known?
   A. Above 1.960 and below -1.960
   B. Above 1.645 and below -1.645
   C. Above 2.576 and below -2.576
   D. Above 1.000 and below -1.000

15. For an alternative hypothesis: \( \mu > 6,700 \), where is the rejection region for the hypothesis test located?
   A. In both tails
   B. In the left or lower tail
   C. In the right or upper tail
   D. In the center

16. For a one-tailed hypothesis test, the critical z value of the test statistic is -2.33. Which of the following is true about the hypothesis test?
   A. \( \alpha = 0.05 \) for a lower-tailed test
   B. \( \alpha = 0.01 \) for a lower-tailed test
   C. \( \alpha = 0.05 \) for an upper-tailed test
   D. \( \alpha = 0.01 \) for an upper-tailed test

17. Based on the Nielsen ratings, the local CBS affiliate claims its 11 p.m. newscast reaches 41% of the viewing audience in the area. In a survey of 100 viewers, 36% indicated that they watch the late evening news on this local CBS station. What is the \( p \)-value?
   A. 0.3461
   B. 0.1539
   C. 0.3078
   D. 0.0100
18. A hypothesis regarding the weight of newborn infants at a community hospital is that the mean is 6.6 pounds. A sample of seven infants is randomly selected and their weights at birth are recorded as 9.0, 7.3, 6.0, 8.8, 6.8, 8.4, and 6.6 pounds. The null hypothesis is ______.

A. \( H_0: \mu = 6.6 \)
B. \( H_0: \mu \geq 6.6 \)
C. \( H_0: \mu > 7.6 \)
D. \( H_0: \mu \leq 7.6 \)

19. A hypothesis regarding the weight of newborn infants at a community hospital is that the mean is 6.6 pounds. A sample of seven infants is randomly selected and their weights at birth are recorded as 9.0, 7.3, 6.0, 8.8, 6.8, 8.4, and 6.6 pounds. If \( \alpha = 0.05 \), what is the critical \( t \) value?

A. -2.365
B. ±1.96
C. ±2.365
D. ±2.447

20. A hypothesis regarding the weight of newborn infants at a community hospital is that the mean is 6.6 pounds. A sample of seven infants is randomly selected and their weights at birth are recorded as 9.0, 7.3, 6.0, 8.8, 6.8, 8.4, and 6.6 pounds. What is the sample standard deviation?

A. 1.177
B. 1.188
C. 1.386
D. 1.090
21. A recent study focused on the number of times men and women send a Twitter message in a day. The information is summarized next.

<table>
<thead>
<tr>
<th></th>
<th>Sample Size</th>
<th>Sample Mean</th>
<th>Population Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>25</td>
<td>23</td>
<td>5</td>
</tr>
<tr>
<td>Women</td>
<td>30</td>
<td>28</td>
<td>10</td>
</tr>
</tbody>
</table>

At the .01 significance level, is there a difference in the mean number of times men and women send a Twitter message in a day? What is the \( p \)-value for this hypothesis test?

A. 0.0500  
B. 0.0164  
C. 0.0001  
D. 0.0082

22. A recent study focused on the amount of money single men and women save monthly. The information is summarized next. Assume that the population standard deviations are equal.

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<td>30</td>
<td>28</td>
<td>10</td>
</tr>
</tbody>
</table>

At the .01 significance level, do women save more money than men? What is the critical value for this hypothesis test?

A. +6.213  
B. +2.369  
C. +2.632  
D. +2.399
23. A recent study focused on the amount of money single men and women save monthly. The information is summarized next. Assume that the population standard deviations are equal.

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At the .01 significance level, what is the conclusion about the way women and men save?

A. Reject the null hypothesis and conclude that women save more than men.
B. Reject the null hypothesis and conclude that women and men save the same amount.
C. Fail to reject the null hypothesis.
D. Fail to reject the null hypothesis and conclude the means are different.

24. We test for a hypothesized difference between two population means: \( H_0: \mu_1 = \mu_2 \). The population standard deviations are unknown but assumed equal. The number of observations in the first sample is 15, and 12 in the second sample. How many degrees of freedom are associated with the critical value?

A. 24
B. 25
C. 26
D. 27

25. For a hypothesis test comparing two population means, the combined degrees of freedom are 24. Which of the following statements about the two sample sizes is NOT true? Assume the population standard deviations are equal.

A. \( n_1 = 11; n_2 = 13 \)
B. \( n_1 = 12; n_2 = 14 \)
C. \( n_1 = 13; n_2 = 13 \)
D. \( n_1 = 10; n_2 = 16 \)
26. The results of a mathematics placement exam at two different campuses of Mercy College follow:

<table>
<thead>
<tr>
<th>Campus</th>
<th>Sample Size</th>
<th>Mean</th>
<th>Population 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>

What is the computed value of the test statistic?

A. 9.30
B. 2.60
C. 3.37
D. 3.40

27. An investigation of the effectiveness of a training program to improve customer relationships included a pre-training and post-training customer survey. To compare the differences they computed (post-training survey score - pre-training survey score). Seven customers were randomly selected and completed both surveys. The results follow.

<table>
<thead>
<tr>
<th>Customer</th>
<th>Pre-training Survey</th>
<th>Post-training Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>B</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>D</td>
<td>7</td>
<td>10</td>
</tr>
<tr>
<td>E</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>F</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>G</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

For a 0.05 significance level, what is the critical value?

A. 1.943
B. 1.895
C. 1.645
D. 2.447
28. An investigation of the effectiveness of a training program to improve customer relationships included a pre-training and post-training customer survey. To compare the differences they computed (post-training survey score - pre-training survey score). Seven customers were randomly selected and completed both surveys. The results follow.

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</tbody>
</table>

For a 0.05 significance level, what is the decision regarding the hypothesis that the training was effective in improving customer relationships?

A. Reject the null hypothesis and conclude that the training was effective.
B. Reject the null hypothesis and conclude that the training was ineffective.
C. Fail to reject the null hypothesis and conclude that the mean survey scores are the same.
D. Fail to reject the null hypothesis and conclude that the mean survey scores are not equal.

29. Consider independent simple random samples that are taken to test the difference between the means of two populations. The variances of the populations are unknown, but are assumed to be equal. The sample sizes of each population are \( n_1 = 37 \) and \( n_2 = 45 \). The appropriate distribution to use is the:

A. \( t \) distribution with \( df = 82 \).
B. \( t \) distribution with \( df = 81 \).
C. \( t \) distribution with \( df = 41 \).
D. \( t \) distribution with \( df = 80 \).
30. Use the following table to determine whether or not there is a significant difference between the average hourly wages at two manufacturing companies.

<table>
<thead>
<tr>
<th>Manufacturer 1</th>
<th>Manufacturer 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$n_1 = 81$</td>
<td>$n_2 = 64$</td>
</tr>
<tr>
<td>$\bar{x}_1 = $15.80</td>
<td>$\bar{x}_2 = $15.00</td>
</tr>
<tr>
<td>$\sigma_1 = $3.00</td>
<td>$\sigma_2 = $2.25</td>
</tr>
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</table>

The $p$-value is ______.

A. 0.036  
B. 0.0336  
C. 0.4664  
D. 2.58

31. What is the range of values for a coefficient of correlation?

A. 0 to +1.0  
B. -3 to +3 inclusive  
C. -1.0 to +1.0 inclusive  
D. Unlimited range

32. If $r = 0.65$, what does the coefficient of determination equal?

A. 0.1945  
B. 0.4225  
C. 0.5778  
D. 0.8061

33. In the regression equation, what does the letter "X" represent?

A. The $Y$-intercept  
B. The slope of the line  
C. The independent variable  
D. The dependent variable
34. What are the degrees of freedom used to test the significance of the slope in a simple linear regression equation?

A. n - 1  
B. n - 2  
C. n - 1, n - 2  
D. (n - 1)(n - 2)

35. The regression equation is \( \hat{Y} = 29.29 - 0.96X \), the sample size is 8, and the standard error of the slope is 0.22. What is the critical value to test the significance of the slope at the 0.01 significance level?

A. \( z = +2.576 \)  
B. \( t = +3.707 \)  
C. \( t = +3.355 \)  
D. \( t = \pm 3.707 \)

36. The regression equation is \( \hat{Y} = 30 + 2.56X \), the sample size is 14, and the standard error of the slope is 0.97. What is the critical value to test the significance of the slope at the 0.05 significance level?

A. \( z = \pm 1.96 \)  
B. \( t = \pm 2.179 \)  
C. \( t = \pm 2.145 \)  
D. \( t = +2.145 \)

37. Assume the least squares equation is \( \hat{Y} = 10 + 20X \). What does the value of 10 in the equation indicate?

A. When \( X = 0 \), \( Y = 10. \)  
B. \( X \) increases by 10 for each unit increase in \( Y. \)  
C. \( Y \) increases by 10 for each unit increase in \( X. \)  
D. It is the error of estimation.
38. A sales manager for an advertising agency believes that there is a relationship between the number of contacts that a salesperson makes and the amount of sales dollars earned.

A regression analysis shows the following results:

<table>
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<tr>
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<td>6.560</td>
<td>-1.860</td>
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<tr>
<td>Number of Contacts</td>
<td>2.195</td>
<td>0.176</td>
<td>12.505</td>
<td>0.000</td>
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What is the slope of the linear equation?

A. -12.201  
B. 2.195  
C. -1.860  
D. 12.505

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What is the decision regarding the hypothesis if the slope equals zero?

A. Fail to reject the null hypothesis.  
B. Fail to reject the alternative hypothesis.  
C. Reject the null hypothesis.  
D. Reject the alternative hypothesis.
40. A regression analysis yields the following information:

\[ \hat{Y} = 2.21 + 1.49X; \; n = 10; \; s_{YX} = 1.66; \; \Sigma X = 32; \; \Sigma X^2 = 134; \; \Sigma (X - \bar{X})^2 = 31.6 \]

Compute the 95% prediction interval when \( X = 4 \).

(Hint: apply the formula “Confidence interval for the mean of Y, given X”)

A. 0.0, 4.05
B. 2.67, 5.33
C. 4.118, 12.226
D. 6.873, 9.527
1. C
2. A
3. A
4. A
5. D
6. C
7. A
8. C
9. A
10. B
11. A
12. D
13. A
14. C
15. C
16. B
17. B
18. A
19. D
20. A
21. B
22. D
23. C
24. B
25. A
26. C
27. A
28. A
29. D
30. B
31. C
32. B
33. C
34. B
35. D
36. B
37. A
38. B
39. C
40. C