Quiz 9 Hypothesis Test. COB 191 Name _____ Grade _____

Excel Reminders:

= NORMSDIST(z value) = NORMSINV (probability)

= NORMDIST (x value, mu, sigma, TRUE) = NORMINV (probability, mu, sigma)

=TINV(probability, deg. freedom) =TDIST(t value, deg. freedom, # of tails)

Please provide computational details for questions and problems to get any credit.

1. Which of the following would be an appropriate null hypothesis?
   a) The mean of a population is equal to 55.
   b) The mean of a sample is equal to 55.
   c) The mean of a population is greater than 55.
   d) The mean of a population is less than 55.

2. Which of the following would be an appropriate alternative hypothesis?
   a) The mean of a population is equal to 55.
   b) The mean of a sample is equal to 55.
   c) The mean of a population is greater than 55.
   d) The mean of a sample is greater than 55.

3. If the *p* value is less than α in a two-tailed test,
   a) the null hypothesis should not be rejected.
   b) the null hypothesis should be rejected.
   c) a one-tailed test should be used.
   d) no conclusion should be reached.

4. If the Type I error (α) for a given test is to be decreased, then for a fixed sample size *n*
   a) the Type II error (β) will also decrease.
   b) the Type II error (β) will increase.
   c) the power of the test will increase.
   d) a one-tailed test must be utilized.

<u>The problem below is associated with questions 5 to 7.</u>

A filling machine at a local soft drinks company is calibrated to fill the cans at an average amount of 12 fluid ounces and a standard deviation of 0.5 ounces. The company wants to test whether the standard deviation of the amount filled by the machine is indeed 0.5 ounces. A random sample of 16 cans filled by the machine reveals a standard deviation of 0.67 ounces.

5. What is the parameter of interest in the test? ____σ = 0.5 oz_____
   a) σ = 0.5 oz b). μ = 12 oz c). σ = 0.67 oz d). s = 0.67 oz

6. Which test would you use?
   a) *Z*-test of a population mean
   b) *Z*-test of a population standard deviation
   c) *t*-test of population mean
   d) χ^2-test of population variance

7. Give the null and alternative hypotheses: Ho: σ = 0.5 oz Ha: σ ≠ 0.5 oz
   a) Ho: σ = 0.5 oz Ha: σ ≠ 0.5 oz
   b) Ho: σ = 0.67 oz Ha: σ ≠ 0.67 oz
   c) Ho: s = 0.67 oz Ha: s ≠ 0.67 oz
   d) Ho: μ = 12 oz Ha: μ ≠ 12 oz

<u>The problem below is associated with questions 8 to 11.</u>

A filling machine at a local soft drinks company is calibrated to fill the cans at an average amount of 12 fluid ounces and a standard deviation of 0.5 ounces. The company wants to test whether the mean amount filled by the machine is indeed 12 ounces.

8. What is the parameter of interest in the test? ___ _____
   a) σ = 0.5 oz b). μ = 12 oz c). σ = 0.67 oz d). $\bar{x}$ = 12 oz

9. Which test would you use?

a) *Z*-test of a population mean
b) *Z*-test of a population standard deviation
c) *t*-test of population mean
d) χ^2-test of population variance

10. Give the null and alternative hypotheses: Ho: μ = 12 oz Ha: μ ≠ 12 oz
    a) Ho: σ = 0.5 oz Ha: σ ≠ 0.5 oz
    b) Ho: σ = 0.67 oz Ha: σ ≠ 0.67 oz
    c) Ho: $\bar{x}$ = 12 oz Ha: $\bar{x}$ ≠ 12 oz
    d) Ho: μ = 12 oz Ha: μ ≠ 12 oz

11. If a random sample of 16 cans filled by the machine reveals a mean amount of 11.5 ounces. The company wants to test whether the mean amount filled by the machine is less than 12 ounces. Given the null and alternative hypotheses: Ho : μ ≥ 12 oz Ha: μ < 12 oz
    a) Ho: μ ≥ 12 oz Ha: μ < 12 oz
    b) Ho: μ ≤ 12 oz Ha: μ > 12 oz
    c) Ho: $\bar{x}$ ≥ 12 oz Ha: $\bar{x}$ < 12 oz
    d) Ho: μ = 12 oz Ha: μ ≠ 12 oz

<u>The problem below is associated with questions 12 to 19.</u>
As an entrepreneur, you are considering the purchase of a coin-operated laundry. The present owner claims that over the past 5 years, the average daily revenue was $675 with a population standard deviation of $75. A sample of 30 days reveals daily average revenue of $625. The confidence level 1 – α is 0.99. You are interested in whether the daily average revenue is less than $675 as the present owner claims.

The null and alternative hypotheses are: Ho: μ ≥ $675 Ha: μ < $675

12. Which test would you use?
    a) *Z*-test of a population mean
    b) *Z*-test of a population proportion
    c) *t*-test of population mean
    d) χ^2-test of population proportion

13. Given the confidence level (1 – α) is 99%, what are the critical values? _z_c =NORMSINV(0.99) = 2.33___
    I. t_c = TINV(0.98,29)=2.462
    II. z_c =NORMSINV(0.99) = 2.326
    III. z_c =NORMSINV(0.995) = 2.576
    a) I only b) II only c) III only d) II and III only

14. In terms of the test statistic z* or t*:
    What is the test statistic to be used? __ __
    What is the equation to compute the test statistic? ___see above_____, and

    Calculate the value of the test statistic_____

    a) The test statistic t* should be used and $t^* = \dfrac{\bar{X} - \mu_0}{\sigma_{\bar{x}}} = \dfrac{625 - 675}{75/\sqrt{30}} = -3.6515$
    b) The test statistic t* should be used and $t^* = \dfrac{\bar{X} - \mu_0}{\sigma} = \dfrac{625 - 675}{75} = -2/3$
    c) The test statistic z* should be used and $z^* = \dfrac{\bar{X} - \mu_0}{\sigma_{\bar{x}}} = \dfrac{625 - 675}{75/\sqrt{30}} = -3.6515$

d) The test statistic z* should be used and $z^* = \dfrac{\bar{X} - \mu_0}{\sigma} = \dfrac{625 - 675}{75} = -2/3$

15. Draw a normal chart with two horizontal scales: one for the mean and the other for the test statistic; label the mean, confidence level 1 – α, critical values for the test, and the test statistic on the chart.

16. Suppose the critical value approach is used, state your Decision Rules:
    a) If z* ≥ -2.33, then conclude Ho;
       Otherwise, if Z* < -2.33, then conclude Ha.
    b) If z* ≥ 2.33, then conclude Ho;
       Otherwise, if Z* < 2.33, then conclude Ha.
    c) If z* ≤ 2.33, then conclude Ho;
       Otherwise, if Z* > 2.33, then conclude Ha.
    d) If z* ≤ -2.33, then conclude Ho;
       Otherwise, if Z* > -2.33, then conclude Ha.

17. Suppose the critical value approach is used and the test statistic is - 2.5, which statement is correct?
    a) The alternative hypothesis Ha should be concluded, because the test statistic z*=-2.5 is less than the critical value z_c = -2.33.
    b) The null hypothesis Ho should be concluded, because the test statistic z*=-2.5 is less than the critical value z_c = -2.33.
    c) The alternative hypothesis Ha should be concluded, because the test statistic z*=-2.5 is greater than the critical value z_c = -2.33.
    d) The null hypothesis Ho should be concluded, because the test statistic z*=2.5 is greater than the critical value z_c = 2.33.

18. Interpret your conclusion in the context of the problem _____
19. Suppose that the test statistic is -1.5. Find the *p* value for the test = NORMSDIST(-1.5) = 0.066807_
    a) p-value = NORMSDIST(-1.5) = 0.066807
    b) p-value = NORMSINV(0.99) = 0.066807
    c) p-value = TDIST(0.99,29) = 0.066807
    d) p-value = NORMSDIST(1.5) = 0.066807

20. Suppose the p-value approach is used, state your Decision Rules:
    a) If p-value ≥ α = 0.01, then conclude Ho
       Otherwise, if p-value < α = 0.01, then conclude Ha.
    b) If p-value ≤ α = 0.01, then conclude Ho
       Otherwise, if p-value > α = 0.01, then conclude Ha.
    c) If p-value ≥ α = 0.005, then conclude Ho
       Otherwise, if p-value < α = 0.005, then conclude Ha.
    d) If p-value ≠ α = 0.01, then conclude Ho
       Otherwise, if p-value < α = 0.01, then conclude Ha.