STATISTICS 2023 **NAME IN INK, PRINT**_____

EXAM THREE **SIGNATURE IN INK**_____

FALL 2012 **CWID IN INK**_____

RETAIN THIS EXAM FOR GRADE VERIFICATION ONCE RETURNED TO YOU.

TRUE OR FALSE. Answer with a capital T or F. **(3 points each)**

_____ 1. The p-value of a hypothesis test is the chance of being wrong if the decision is to accept the null hypothesis and conclude that the null hypothesis is supported by the data.

_____ 2. The standard errors of point estimators decrease in magnitude when the sample size increases.

_____ 3. A point estimate is a population parameter used to estimate a sample statistic.

_____ 4. The center value of a confidence interval is the estimated standard error for the point estimate for the parameter of interest.

_____ 5. In a hypothesis test the researcher makes a claim about the value of a population parameter, and then the sample data are used to decide whether the claim should be rejected.

_____ 6. A confidence interval provides a set of reasonable and plausible values for the parameter being estimated and those values would not be rejected if tested in a two tail hypothesis test with the same significance level.

_____ 7. When the null hypothesis is not rejected, then it is concluded that the data in the sample provide evidence in support of the claim stated in the null hypothesis.

T table Questions. Write your answer on the line. **3 points each)**

_____ 8. What is the $P(t > 2.048)$ if $df = 28$?

_____ 9. State the value of t_o, if the $P(t > t_o) = .95$ and the $df = 13$.

_____ 10. What is the $P(- 2.262 < t < 2.262)$ if $df = 9$?

STATE THE ANSWER. Write the answer on the line. (3 points each)

_____ 11. If the point estimate for the mean is 12 and the bound of error for a 95% confidence interval to estimate the mean is 22.8, then what is the 95% confidence interval?

_____ 12. If a 99% confidence interval to estimate the mean of a population of company profits is 532 to 613, what is the numerical value of the point estimate for the mean of company profits?

_____ 13. If the numerical value of the z-multiplier for a confidence interval to estimate the population mean based on a sample of 200 observations is 1.96, what is the confidence level on which the interval was calculated?

_____ 14. The t-test statistic based on 12 observations must be greater than what numerical value in order to reject the null hypothesis in a right-tail test with 1% significance level?

_____ 15. If the value of the z-test statistic is -1.85 in a hypothesis test on the population mean, but the researcher is interested in showing that the mean is more than some specific number and had stated that in the alternative hypothesis, what is the p-value in this situation?

_____ 16. In a two-tail hypothesis test based on a random sample of only fourteen observations the null hypothesis could be rejected at a 5% significance level if the t test statistic value exceeds what number?

_____ 17. If a two-tail hypothesis test on the population mean based on a large sample provides a p-value of 0.1188, what is the positive value of the test statistic?

_____18. How many observations are required to estimate the average miles per gallon for a certain type of car with 95% confidence interval that is 3 units wide, if the variance in the miles per gallon for this type of car is known to be 25?

_____ 19. The percent change for eight days for a stock are the following values: 1.5, 2.1, 0.3, 0.8, -0.9, 1.1, -0.8, -1.2. What is the sample standard deviation from this sample of percent change values for this stock? Round your answer to two digits past the decimal.

_____ 20. If the p-value in a hypothesis test is .0312, then for which of the following value, or values, of alpha, .10, .05, .01, or .001, could the null hypothesis be rejected?

STATE THE ANSWER. Write the answer on the line. (3 points each)

The average size of new house construction in the US has leveled off over the last 5 years, after many years of increasing. A random sample of 16 houses under construction in 2011 had a mean of 2,447 square feet and a standard deviation of 148 square feet. Use this information to answer the next four questions.

_____ 21. What is the point estimate for the mean of new house size in the US for 2011 based on these 16 observations?

_____ 22. What is the estimated standard error of the point estimate for the mean of new house size in 2011?

_____ 23. If the estimated standard error for the estimate of the mean new house size is 35.4, what is the bound of error for a 90% confidence interval to estimate the mean new house size for 2011? State your answer with four digits past the decimal.

_____ 24. If the bound of error for a 90% confidence interval is 70 square feet what is the 90% confidence interval to estimate the population mean based on the sample mean stated above? State the interval.

Four hundred students, who attended summer school at OSU last summer, were surveyed about whether they plan to attend summer school at OSU in 2013. Out of the four hundred students questioned 126 stated that they planned to attend summer school at OSU in 2013. Use this information to answer the remaining questions on this page.

_____ 25. Based on this sample, what is the point estimate for the proportion of students who plan to attend summer school at OSU in 2013?

_____ 26. What is the estimated standard error for the point estimate for the proportion of students who plan to attend summer school at OSU in 2013? Round to four digits past the decimal.

_____ 27. Assume the estimated standard error of the point estimate for the proportion of students who plan to attend summer school at OSU in 2013 is 0.0225. Then, what is the numerical value of the z-test statistic to check if the proportion is equal to 25% against an alternative that the proportion is more than 25%? Round your answer to two digits past the decimal.

STATE THE ANSWER. Write the answer on the line. (3 points each)

The use of a far-infrared heat sauna helps to ensure good skin and joint health, in addition to assisting with weight loss. The mean time required for a regular heat sauna to reach 110°F is 22 minutes. A type of heat sauna made in Canada, the SaunaRay sauna, is advertised to heat up more quickly than a regular heat sauna. A SaunaRay sauna was timed during 25 heating-up periods to 110°F and the average time observed from these 25 observations was 20.4 minutes with a standard deviation of 2.5 minutes. Use these data as a random sample to answer the questions on this page.

_____ 28. State the appropriate alternative hypothesis if the research question is, "Do these 25 observations provide evidence that the SaunaRay sauna heats up to 110°F in less time on average than a regular heat sauna?"

_____ 29. What is the numerical value of the test statistic to test the null hypothesis that the mean amount of time required for the SaunaRay sauna to heat to 110°F is equal to 22 minutes?

_____ 30. What is the name of the distribution of the test statistic, if in fact the average amount of time required for the SaunaRay sauna to heat to 110°F is equal to 22 minutes?

_____ 31. If the numerical value of the test statistic in this case was -2.9 then the p-value of this hypothesis test would be between what two values?

_____ 32. If the researcher performing this hypothesis test can not tolerate more than 1% chance of rejecting a true null hypothesis, then what value must the test statistic be less than in order to reject the null hypothesis?

_____ 33. If the p-value of this hypothesis test is between 0.005 and 0.01 and the significance level chosen by the researcher is 0.01, do the data provide the statistical evidence to advertise the SaunaRay Sauna as described above? Answer YES or NO.