STATISTICS 2023 **NAME IN PRINT**_____

FINAL EXAM **SIGNATURE IN INK**_____

SPRING 2002 **SS # OR ID IN INK**_____

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

F 1. If a hypothesis test on a population mean produced a z-test statistic of 0.6 then the researcher would conclude with an alpha-value of only 1% that the null hypothesis is false.

F 2. The confidence level, the standard deviation and the value of the sample mean affect the width of a confidence interval to estimate the population mean.

F 3. The null hypothesis in a hypothesis test is the statement that can be supported by the data in the study.

T 4. The p-value of a hypothesis test is the error rate that must be tolerated if the null hypothesis is rejected.

F 5. The t and Z probability density functions are both right skewed.

F 6. Hypotheses are statements about values of point estimates.

F 7. Standard errors for point estimates decrease in magnitude as the size of the sample decreases.

F 8. The statement that is assumed true and tested for validity in the hypothesis test process is the alternative hypothesis test.

T 9. An interval estimator for a population parameter called a confidence interval provides a set of reasonable and plausible values for the parameter.

T 10. If the value of the estimated linear correlation, r, is close to positive one then a researcher could conclude that the bivariate data lies close to an upward sloping line.

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

28 11. What is the numerical value of the mean of a sample of seven observations, 43, 26, 22, 15, 24, 41, and 25?

10.23 12. What is the numerical value of the standard deviation of a sample of seven observations, 43, 26, 22, 15, 24, 41, and 25? Round your answer to two digits past the decimal.

.016 13. If a hypothesis test based on a large sample has a test statistic value of 2.41 and the researcher is trying to prove that the population mean is not equal to some stated value what is the p-value of the hypothesis test?

1.97 14. If the p-value in a right tail hypothesis test based on a z-test statistic is equal to 0.0244 what is the numerical value of the test statistic?

2.160 15. In a two-tail hypothesis test based on a small sample of 14 observations the absolute value of the test statistic must exceed what number for the researcher to reject the null hypothesis with only a 0.05 error rate?

$\mu_1 - \mu_2 > 5$ 16. If a researcher who was comparing the means of two populations was attempting to prove that the mean of population one is more than 5 units larger than the mean of population two what is the appropriate alternative hypothesis?

2.5 17. If the mean of the sample from population one is 12.3 and the mean of the sample from population two is 9.8 what is the numerical value of the point estimate for the mean of population one minus the mean of population two?

4.995 18. If a sample of 23 observations had a sample variance of 4.5 and a sample of 19 observations had a sample variance of 5.6 then what is the numerical value of the pooled variance estimate based on these two samples? State three digits past the decimal.

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

The average returns for two types of $4,000 investments were compared using the following data. Returns on investments of each type were recorded for a one-year time period. Use this information to answer the questions on this page.

Investment Type One	**Investment Type Two**
n_1=40	**n_2=50**
mean=$260	**mean=$250**
variance=81	**variance=64**

250 19. What is the numerical value of the point estimate for the mean return on investment type two?

8 20. What is the numerical value of the point estimate for the standard deviation of the return on investment type two?

1.13137 21. What is the estimated standard error of the point estimate for the mean return on investment type two?

± 10 22. What is the numerical value of the point estimate for the difference between the average returns for these two types of investments?

1.8 23. What is the estimated standard error of the point estimate for the difference between the average returns for these two types of investments? Round your answer to one digit past the decimal.

3.92 24. If the estimated standard error of the point estimate for the difference between the average returns for these two types of investments is 2 units what is the bound of error for a 95% confidence interval to estimate the difference between the mean returns on these two types of investments?

71.53 25. A pooled variance estimate would probably not be used in this case due to large sample sizes, but if it were calculated what would be the numerical value of the pooled variance estimate based on these two samples? Round your answer to two digits past the decimal.

± 2.576 26. The observed test statistic in this case would have to exceed what magnitude for the data to indicate at the 1% significance level that the two types of investments do not result in equal mean returns?

LINEAR REGRESSION QUESTIONS. Write the answer on the line. (3 point each)

The number of persons in households with children in high school was used to estimate the number of vehicles that the family had insured. The bivariate data recorded below are number of persons in the household (X) and number of insured vehicles (Y). Use this data to answer the next five questions.

X	6	3	4	7	5
Y	3	2	3	4	2

$\Sigma x = 25$, $\Sigma y = 14$

$\Sigma x^2 = 135$ $\Sigma y^2 = 42$

$SS_x = 10$, $SS_y = 2.8$, $SS_{xy} = 4$ $\Sigma xy = 74$

2.8 27. What is the numerical value of the corrected sum of squares for the y-variable based on the above data?

.4 28. What is the least squares estimate of the slope in the linear regression equation to estimate the number of insured vehicles from the number of persons in the household?

.8 29. What is the least squares estimate of the y-intercept in the linear regression equation to estimate the number of insured vehicles from the number of persons in the household?

$\hat{y} = .8 + .4x$ 30. Write the estimated regression equation to estimate the number of insured vehicles from the number of persons in the household. Use the estimates of the slope and y-intercept that you calculated in problems 28 and 29 above.

.7559 31. What is the numerical value of the estimated linear correlation between the two variables, the number of insured vehicles and the number of persons in the household? Round your answer to four digits past the decimal.

ANOTHER LINEAR REGRESSION QUESTION.

The estimated linear regression equation below uses X=electricity cost to estimate Y=total manufacturing cost of a certain product. Use it to answer the remainder of the questions on this page. y-hat = 1,643 + 23.04x

12,817.4 32. When the electricity cost is $485 what is the least squares estimate for the total manufacturing cost of the product?

3.6 33. If the estimated standard error for the estimate of the slope is 6.4 what is the value of the test statistic to test whether the slope is equal to zero?