STATISTICS 2023   NAME IN PRINT_____*Key*_____

FINAL EXAM   SIGNATURE IN INK_____

SPRING 2001   SS # OR ID IN INK_____

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

___F___ 1. The center value of a confidence interval is the standard error of the point estimate for the parameter being estimated.

___F___ 2. If the observed value of the test statistic were less than one in magnitude then the null hypothesis of equal population means would be rejected with a significance level of 1% or less.

___F___ 3. When the null hypothesis in a hypothesis test is not rejected then the researcher concludes that the data supports the idea in the null hypothesis statement.

___T___ 4. The p-value of a hypothesis test is the error rate that must be tolerated if the researcher concludes that the data supports the idea stated in the alternative hypothesis.

___F___ 5. The numerical value of the point estimate is used as the hypothetical value of the parameter that is stated in the null hypothesis.

___T___ 6. Confidence intervals provide a range of possible values for the parameter being estimated, but it is possible that the actual value of the parameter may not be contained in the interval of values stated.

___T___ 7. Standard errors for point estimates are based on the variance in the population from which the sample was drawn and the sample size.

___F___ 8. A regression line is fitted to a set of bivariate data by maximizing the squared vertical distance between the data values and the estimated regression line.

___F___ 9. If the estimated linear correlation were the value 0.24 then it would be concluded that a model that fits a line to the data is a good model to describe the y-variable, based on the x-variable.

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

Assume that the cost of an oil change for nine automobiles is listed below in dollars:

14, 23,   26, 14, 18, 21, 16, 19, 20

Use these information to answer the next four questions.

19

_____10. What is mean cost of an oil change that was observed in the above sample of nine oil change costs?

4.03

_____11. What is the numerical value of the standard deviation of the cost of an oil change based on the nine observed oil change values listed above? Round your answer to two digits past the decimal.

−1.5

_____12. If the mean and standard deviation for the sample of nine oil change costs were the values of 20 and 6, respectively, then what is the value of the test statistic to test the hypothesis that the mean cost of an oil change is equal to 23 dollars?

(15.388, 24.612) 13. If the mean and standard deviation for the sample of nine oil change costs were the values of 20 and 6, respectively, then what is a 95% confidence interval to estimate the mean cost of an oil change?

The following questions are not related to the questions above.

$M_1 - M_2 < -8$ 14. If a researcher wants to investigate whether the mean of population two exceeds the mean of population one by more than 8 units, then what would be the form of the alternative hypothesis?

.0027

_____15. If a right tail hypothesis test based on a large sample produces a test statistic value of 2.78 what is the p-value of the hypothesis test?

$.02 < P < .05$

_____16. If a two-tail hypothesis test based on a sample of twenty observations produced a test statistic value of 2.2, then the p-value for the hypothesis test would be between what two values?

.05

_____17. If a researcher has decided based on data in two large samples to reject the null hypothesis of equal population means for values of the test statistic less than −1.96 or more than 1.96, what is the significance level used by the researcher?

56

_____18. If a 95% confidence interval to estimate the difference between two population means is the interval, (45, 67), what is the numerical value of the point estimate for the difference between the two population means?

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

An Internet day-trader wants to compare the mean monthly percent increase on two NASDAQ stocks for the past 15 months. The percent increase for two stocks were recorded for 15 months and the summary statistics appear below. Use this information to answer the questions on this page.

Stock One	Stock Two
$n_1=15$	$n_2=15$
mean=29	mean=18
variance=121	variance=144

_____*11*_____19. What is the numerical value of the point estimate for the difference between the mean monthly percent increase of stock one and the mean monthly percent increase of stock two?

_____*132.5*_____20. What is the numerical value of the pooled variance estimator that would occur from the above two samples?

_____*4*_____21. Assume that the pooled variance estimate that results from the above samples is the value 120, what is the estimated standard error of the point estimate for the difference between the mean monthly percent increase of stock one and the mean monthly percent increase of stock two?

_____*2*_____22. If the estimated standard error of the point estimate for the difference between the mean monthly percent increases for these two stocks is 3 units, what is the value of the test statistic to check the hypothesis that the difference in mean monthly percent increases for the two stocks is 5 percent?

_____*.01 < p < .02*_____23 Assume the value of the test statistic is 2.6 to check the hypothesis that the difference in the mean monthly percent increases for the two stocks is 5 percent. What is the p-value for this situation if you consider it a two-tail situation?

_____*2.763*_____24. The magnitude of the observed test statistic in this case would have to exceed what value (state a positive number) for a researcher to conclude that the difference in the mean monthly percent increases for the two stocks is not equal to 5 percent at the 1% significance level?

_____*12*_____25. What is the numerical value of the point estimator for the standard deviation of the monthly percent increases for stock two?

LINEAR REGRESSION QUESTIONS. Write the answer on the line.   (3 point each)
Assume an estimated linear regression model based on twenty observations appears:
y-hat=43 + 21x. Use this information to answer the next three questions.

1, 219

26. What is the estimate of the mean of y when x is 56?

210

27. What is the change in the estimate of y when the x value changes
by 10 units?

1. 5

28. If the estimated standard error for the least squares estimate of
the slope is 14 what is the value of the test statistic to test whether the slope is equal to
0 against an alternative statement that the slope is greater than 0?

ANOTHER LINEAR REGRESSION QUESTION.
The number of college-aged persons in a family was used to estimate the number of
vehicles that the family has insured. The bivariate data recorded below are number of
college-aged persons in a family (X) and number of insured vehicles in the family (Y).
Use this data to answer the next five questions.

X	2	1	3	3	1
Y	4	3	5	6	2

1.5

29. 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
college-aged persons in the family?

1

30. 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 college-aged persons in the family?

$\hat{y} = 1 + 1.5 x$

31. Write the estimated regression equation to
estimate the number of insured vehicles from the number of college-aged persons in the
family. Use the estimates of the slope and y-intercept that you calculated in the two
problems above.

10

32. What is the numerical value of the corrected sum of squares
for the variable number of insured vehicles based on the above data?

.95

33. What is the numerical value of the estimated linear correction
between the two variables, the number of insured vehicles and the number of college-
aged persons in the family? Round your answer to two digits past the decimal.