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INSTRUCTOR

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MS 3043 HW11 Simple Regression Significance Tests (Homework)

Current Score	Due Date
QUESTION 1 2 3 4 5	SAT, MAY 9, 2020 10:29 AM GMT+5:30
Assignment Submission & Scoring Assignment Submission For this assignment, you submit answers by question parts. The number of submissions remaining for each question part only changes if you submit or change the answer. Assignment Scoring Your best submission for each question part is used for your score.	

What is the purpose of testing whether $\beta_1 = 0$?

- ☐ The purpose of testing whether $\beta_1 = 0$ is to determine whether or not there is a cause-and-effect relationship between x and y .
- ☐ The purpose of testing whether $\beta_1 = 0$ is to determine whether or not the regression line provides a good fit for the data.
- ☐ The purpose of testing whether $\beta_1 = 0$ is to determine whether or not the mean of the x values is equal to the mean of the y values.
- ☒ The purpose of testing whether $\beta_1 = 0$ is to determine whether or not there is a significant relationship between x and y .



If we reject $\beta_1 = 0$, does it imply a good fit?

- ☐ Rejecting $\beta_1 = 0$ always implies a good fit. If $\beta_1 = 0$ is rejected, there is a statistically significant relationship between x and y which always implies a good fit.
- ☒ Rejecting $\beta_1 = 0$ does not necessarily imply a good fit. For example, if $\beta_1 = 0$ is rejected and r^2 is low, there is a statistically significant relationship between x and y but the fit is not very good.
- ☐ Rejecting $\beta_1 = 0$ never implies a good fit. If $\beta_1 = 0$ is rejected, there is not a statistically significant relationship between x and y which never implies a good fit.
- ☐ Rejecting $\beta_1 = 0$ does not necessarily imply a good fit. For example, if $\beta_1 = 0$ is rejected and r^2 is high, there is a statistically significant relationship between x and y but the fit is not very good.



Need Help?

Read It

Talk to a Tutor

You may need to use the appropriate [technology](#) to answer this question.

Consider the data.

x_i	2	6	9	13	20
y_i	8	18	8	28	25

- (a) What is the value of the standard error of the estimate? (Round your answer to three decimal places.)

7.239 

- (b) Test for a significant relationship by using the t test. Use $\alpha = 0.05$.

State the null and alternative hypotheses.

- ☐ $H_0: \beta_0 = 0$
 $H_a: \beta_0 \neq 0$
☐ $H_0: \beta_0 \neq 0$
 $H_a: \beta_0 = 0$
☐ $H_0: \beta_1 \geq 0$
 $H_a: \beta_1 < 0$
☐ $H_0: \beta_1 \neq 0$
 $H_a: \beta_1 = 0$
☒ $H_0: \beta_1 = 0$
 $H_a: \beta_1 \neq 0$



Find the value of the test statistic. (Round your answer to three decimal places.)

1.904 

Find the p -value. (Round your answer to four decimal places.)

p -value = 0.1530 

State your conclusion.

- ☐ Reject H_0 . We cannot conclude that the relationship between x and y is significant.
☒ Do not reject H_0 . We cannot conclude that the relationship between x and y is significant.
☐ Do not reject H_0 . We conclude that the relationship between x and y is significant.
☐ Reject H_0 . We conclude that the relationship between x and y is significant.



(c) Use the F test to test for a significant relationship. Use $\alpha = 0.05$.

State the null and alternative hypotheses.

- ☐ $H_0: \beta_1 \neq 0$
 $H_a: \beta_1 = 0$
- ☐ $H_0: \beta_0 \neq 0$
 $H_a: \beta_0 = 0$
- ☐ $H_0: \beta_1 \geq 0$
 $H_a: \beta_1 < 0$
- ☐ $H_0: \beta_0 = 0$
 $H_a: \beta_0 \neq 0$
- ☒ $H_0: \beta_1 = 0$
 $H_a: \beta_1 \neq 0$



Find the value of the test statistic. (Round your answer to two decimal places.)

3.63



Find the p -value. (Round your answer to three decimal places.)

p -value = 0.1530



What is your conclusion?

- ☐ Do not reject H_0 . We conclude that the relationship between x and y is significant.
- ☐ Reject H_0 . We conclude that the relationship between x and y is significant.
- ☒ Do not reject H_0 . We cannot conclude that the relationship between x and y is significant.
- ☐ Reject H_0 . We cannot conclude that the relationship between x and y is significant.



Need Help?

Read It

Master It

Talk to a Tutor

You may need to use the appropriate [technology](#) to answer this question.

Consider the following data on price (\$) and the overall score for six stereo headphones tested by a certain magazine. The overall score is based on sound quality and effectiveness of ambient noise reduction. Scores range from 0 (lowest) to 100 (highest).

Brand	Price (\$)	Score
A	180	74
B	150	71
C	95	61
D	70	58
E	70	40
F	35	26

- (a) The estimated regression equation for this data is $\hat{y} = 24.666 + 0.303x$, where x = price (\$) and y = overall score. Does the t test indicate a significant relationship between price and the overall score? Use $\alpha = 0.05$.

State the null and alternative hypotheses.

☐ $H_0: \beta_0 = 0$
 $H_a: \beta_0 \neq 0$

☐ $H_0: \beta_1 \neq 0$
 $H_a: \beta_1 = 0$

☒ $H_0: \beta_1 = 0$
 $H_a: \beta_1 \neq 0$

☐ $H_0: \beta_1 \geq 0$
 $H_a: \beta_1 < 0$

☐ $H_0: \beta_0 \neq 0$
 $H_a: \beta_0 = 0$



Find the value of the test statistic. (Round your answer to three decimal places.)

3.952

Find the p -value. (Round your answer to four decimal places.)

p -value = 0.0168

What is your conclusion?

- ☐ Do not reject H_0 . We cannot conclude that the relationship between price (\$) and overall score is significant.
- ☐ Do not reject H_0 . We conclude that the relationship between price (\$) and overall score is significant.
- ☐ Reject H_0 . We cannot conclude that the relationship between price (\$) and overall score is significant.
- ☒ Reject H_0 . We conclude that the relationship between price (\$) and overall score is significant.



(b) Test for a significant relationship using the F test. Use $\alpha = 0.05$.

State the null and alternative hypotheses.

- ☐ $H_0: \beta_1 \neq 0$
 $H_a: \beta_1 = 0$
- ☒ $H_0: \beta_1 = 0$
 $H_a: \beta_1 \neq 0$
- ☐ $H_0: \beta_0 \neq 0$
 $H_a: \beta_0 = 0$
- ☐ $H_0: \beta_1 \geq 0$
 $H_a: \beta_1 < 0$
- ☐ $H_0: \beta_0 = 0$
 $H_a: \beta_0 \neq 0$



Find the value of the test statistic. (Round your answer to two decimal places.)

15.62



Find the p -value. (Round your answer to three decimal places.)

p -value = 0.0168



What is your conclusion?

- ☒ Reject H_0 . We conclude that the relationship between price (\$) and overall score is significant.
- ☐ Reject H_0 . We cannot conclude that the relationship between price (\$) and overall score is significant.
- ☐ Do not reject H_0 . We conclude that the relationship between price (\$) and overall score is significant.
- ☐ Do not reject H_0 . We cannot conclude that the relationship between price (\$) and overall score is significant.



- (c) Show the ANOVA table for these data. (Round your p -value to three decimal places and all other values to two decimal places.)

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	p -value
Regression	1375.67 ✓	1 ✓	1375.67 ✓	15.62 ✓	0.017 ✓
Error	352.33 ✓	4 ✓	88.08 ✓		
Total	1728 ✓	5 ✓			

Need Help?

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Watch It

Talk to a Tutor

You may need to use the appropriate [technology](#) to answer this question.

The American Association of Individual Investors (AAII) On-Line Discount Broker Survey polls members on their experiences with discount brokers. As part of the survey, members were asked to rate the quality of the speed of execution with their broker as well as provide an overall satisfaction rating for electronic trades. Possible responses (scores) were no opinion (0), unsatisfied (1), somewhat satisfied (2), satisfied (3), and very satisfied (4). For each broker summary scores were computed by calculating a weighted average of the scores provided by each respondent. Suppose a portion of the survey results follow.

Brokerage	Speed	Satisfaction
A	3.4	3.5
B	3.3	3.4
C	3.4	3.9
D	3.6	3.8
E	3.2	2.9
F	3.8	2.8
G	3.8	3.6
H	2.6	2.5
I	2.7	2.3
J	4.0	4.0
K	2.5	2.5

These ratings data on x = the quality of the speed of execution and y = overall satisfaction with electronic trades provided the estimated regression equation $\hat{y} = 0.078 + 0.946x$. At the 0.05 level of significance, test whether speed of execution and overall satisfaction are related. (Use the F test.)

State the null and alternative hypotheses.

- ☐ $H_0: \beta_1 \geq 0$
 $H_a: \beta_1 < 0$
- ☐ $H_0: \beta_1 \neq 0$
 $H_a: \beta_1 = 0$
- ☒ $H_0: \beta_1 = 0$
 $H_a: \beta_1 \neq 0$
- ☐ $H_0: \beta_0 = 0$
 $H_a: \beta_0 \neq 0$
- ☐ $H_0: \beta_0 \neq 0$
 $H_a: \beta_0 = 0$



Set up the ANOVA table. (Round your for F to two decimal places and all other values to three decimal places.)

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F	p -value
Regression	2.328 	1 	2.328 	14.04 	0.005
Error	1.492 	9 	0.166 		
Total	3.82 	10 			

Find the value of the test statistic. (Round your answer to two decimal places.)

Find the p -value. (Round your answer to three decimal places.)

p -value =

What is your conclusion?

- ☐ Do not reject H_0 . We cannot conclude that the relationship between speed of execution and overall satisfaction is significant.
- ☐ Do not reject H_0 . We conclude that the relationship between speed of execution and overall satisfaction is significant.
- ☐ Reject H_0 . We cannot conclude that the relationship between speed of execution and overall satisfaction is significant.
- ☒ Reject H_0 . We conclude that the relationship between speed of execution and overall satisfaction is significant.



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5.



PREVIOUS ANSWERS

MY NOTES

You may need to use the appropriate [technology](#) to answer this question.

Consider the following data on x = weight (pounds) and y = price (\$) for 10 road-racing bikes.

Brand	Weight	Price (\$)
A	17.8	2,100
B	16.1	6,250
C	14.9	8,370
D	15.9	6,200
E	17.2	4,000
F	13.1	8,500
G	16.2	6,000
H	17.1	2,680
I	17.6	3,400
J	14.1	8,000

These data provided the estimated regression equation $\hat{y} = 28,280 - 1,421x$. For these data, $SSE = 7,062,767.99$ and $SST = 50,936,800$. Use the F test to determine whether the weight for a bike and the price are related at the 0.05 level of significance.

State the null and alternative hypotheses.

- ☐ $H_0: \beta_1 \geq 0$
 $H_a: \beta_1 < 0$
- ☐ $H_0: \beta_1 \neq 0$
 $H_a: \beta_1 = 0$
- ☐ $H_0: \beta_0 = 0$
 $H_a: \beta_0 \neq 0$
- ☒ $H_0: \beta_1 = 0$
 $H_a: \beta_1 \neq 0$
- ☐ $H_0: \beta_0 \neq 0$
 $H_a: \beta_0 = 0$



Find the value of the test statistic. (Round your answer to two decimal places.)

49.70



Find the p -value. (Round your answer to three decimal places.)

p -value = 0.000



State your conclusion.

- ☒ Reject H_0 . We conclude that the relationship between weight (pounds) and price (\$) is significant.
- ☐ Do not reject H_0 . We conclude that the relationship between weight (pounds) and price (\$) is significant.
- ☐ Reject H_0 . We cannot conclude that the relationship between weight (pounds) and price (\$) is significant.
- ☐ Do not reject H_0 . We cannot conclude that the relationship between weight (pounds) and price (\$) is significant.



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