Tests & Quizzes

Tests & Quizzes

Check Your Understanding of Module 2

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Part 1 of 1 - 0.0 Points

Question 1 of 12

0.0 Points

In a hypothesis test for the slope, when do we use a *t*-statistic instead of a *z*-statistic?

- ○ A. When the response variable follows a normal distribution.
- ○ B. When the sample size is large enough.
- ○ C. None of these are correct.
- ✔ ○ D. When the variance of the regression model, σ^2, is unknown and has to be estimated.

Answer Key: D

Question 2 of 12

0.0 Points

In a hypothesis test for the slope, the *t*-statistic is more commonly used compared to the *z*-statistic, since the variance of the regression model is rarely known in a real-world setting.

✔ ○ True
○ False

Answer Key: True

Question 3 of 12

0.0 Points

What is the formula for the standard error of the slope, $se(\hat{\beta}_1)$?

- ✔ A. $\sqrt{\frac{MS_{res}}{S_{xx}}}$
- B. $\sqrt{\frac{MS_{res}}{S_{xy}}}$
- C. $\sqrt{\frac{SS_{res}}{S_{xx}}}$
- D. $\sqrt{\frac{SS_{res}}{S_{xy}}}$

Answer Key: A

Question 4 of 12

0.0 Points

The standard error of the slope decreases as the fit of the model improves, since the residuals decrease in magnitude, which in turn lead to a smaller MS_{res}.

- ✔ True
- False

Answer Key: True

Question 5 of 12

0.0 Points

What is the appropriate null and alternative hypotheses in a *t* test for significance in regression?

- ✔ A. $H_0 : \beta_1 = 0, H_a : \beta_1 \neq 0.$
- B. $H_0 : \beta_0 = 0, H_a : \beta_0 \neq 0.$
- C. $H_0 : \hat{\beta}_1 = 0, H_a : \hat{\beta}_1 \neq 0.$
- D. $H_0 : \hat{\beta}_0 = 0, H_a : \hat{\beta}_0 \neq 0.$

Answer Key: A

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0.0 Points

In a *t* test for significance in regression, the null hypothesis states there is a linear relationship between the response variable and the predictor; the alternative hypothesis states there is no linear relationship between the response variable and the predictor.

- True

Answer Key: False

Feedback:

The meaning of the null and alternative hypotheses have been swapped.

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0.0 Points

What is the *t* statistic for the *t* test for significance in regression? What distribution is the *t* statistic compared to in SLR?

- ✔ ◯ A. $t = \frac{\hat{\beta}_1}{se(\hat{\beta}_1)}$ is compared to a t_{n-2} distribution.
- ◯ B. $t = \frac{\hat{\beta}_0}{se(\hat{\beta}_0)}$ is compared to a t_{n-2} distribution.
- ◯ C. $t = \frac{\hat{\beta}_1}{se(\hat{\beta}_1)}$ is compared to a t_{n-1} distribution.
- ◯ D. $t = \frac{\hat{\beta}_0}{se(\hat{\beta}_0)}$ is compared to a t_{n-1} distribution.

Answer Key: A

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0.0 Points

A larger (in magnitude) *t* statistic leads to more evidence against the null hypothesis.

✔ ◯ True
◯ False

Answer Key: True

Feedback:

This is true for any test statistic.

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0.0 Points

In SLR, the *t* test for significance in regression (for a two-sided alternative) gives the same result as the ANOVA *F* test as their null and alternative hypotheses are the same.

✔ ◯ T
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◯ False

Answer Key: True

Feedback:

This is only true in SLR and when the alternative is two-sided for the *t* test.

Question 10 of 12

0.0 Points

Match the following intervals with the appropriate formulas.

A. $\hat{\mu_{y|x_0}} \pm t_{\alpha/2,n-2}\sqrt{MS_{res}(\frac{1}{n}+\frac{(x_0-\bar{x})^2}{S_{xx}})}$

B. $\hat{y_0} \pm t_{\alpha/2,n-2}\sqrt{MS_{res}(1+\frac{1}{n}+\frac{(x_0-\bar{x})^2}{S_{xx}})}$

C. $\hat{\beta}_1 \pm t_{\alpha/2,n-2}se(\hat{\beta}_1)$

Matching Items

- ✔ C — 1. CI for slope
- ✔ A — 2. CI for mean response
- ✔ B — 3. PI for new response

Answer Key: 1:C, 2:A, 3:B

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0.0 Points

Match the interval with the correct scenario to use.

A. This is used in estimating the mean value of the response variable for observations with the same value of the predictor.

B. This is used in estimating the change in the response variable for a unit increase in the predictor.

C. This is used in predicting the value of the response variable for an observation with a given value of the predictor.

Matching Items

- ✔ B — 1. CI for slope
- ✔ A — 2. CI for mean response
- Loading [MathJax]/extensions/MathMenu.js esponse

Answer Key: 1:B, 2:A, 3:C

Question 12 of 12

0.0 Points

Consider the following statements regarding the width of the interval for the slope, mean response, and new response.

- ✔ A. For the CI for mean response and PI for new response, as the value of the predictor moves away from the mean of the predictor, the width of the interval increases.
- ✔ B. The width of the PI for new response is always larger than the width of the CI for mean response (assuming same value of predictor).
- ☐ C. As model fit improves, width increases.
- ✔ ☐ D. As level of confidence increases, width increases.

Answer Key: A, B, D