STAT 6021 (Fall 2020) ❯ 📤 ☑ Tests & Quizzes

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Tests & Quizzes

Check Your Understanding of Module 1

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Part 1 of 1 -   0.0 Points

Question 1 of 12

0.0 Points

Match the following to the corresponding equations:

A. $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_i$

B. $E(y|x) = \beta_0 + \beta_x$

C. $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_i + e_i$

D. $y_i = \beta_0 + \beta_1 x_i + \epsilon_i$

Matching Items

✖	A	1. Simple linear regression equation
✖	C	2. Simple linear regression model
✖	B	3. Estimated simple linear regression equation
✖	D	4. Estimated simple linear regression model

Answer Key: 1:B, 2:D, 3:A, 4:C

Question 2 of 12

0.0 Points

Match the following to the corresponding notation.

A. $\hat{e}_i$

B. $\hat{y}_i$

Matching Items

| ✔ | B | 1. Predicted / fitted values |

✔ | A | 2. Residuals

Answer Key: 1:B, 2:A

Feedback:

Predicted / fitted values match with y_i. This describes the predicted value of the response variable for a given value of the predictor.

Residuals match with y_e. This describes the difference between the actual value of the response variable and the predicted value of the response variable for a given value of the predictor.

Question 3 of 12

0.0 Points

Consider the following statements regarding assumptions made for a linear regression model. Which of the following statement(s) is correct? Select all that apply.

✔   ☐ A. The errors have mean 0.

✔   ☐ B. The errors have an unknown variance σ^2.

✔   ☐ C. The errors are uncorrelated.

Answer Key: A, B, C

Question 4 of 12

0.0 Points

The least squares estimators for the regression coefficients are called the best linear unbiased estimators (BLUE) as they are unbiased and have the minimum variance among all unbiased estimators that are linear combinations of the response variable.

✔   ◯ True
      ◯ False

Answer Key: True

Question 5 of 12

0.0 Points

Match the following regression coefficients to their formulas.

A. $\dfrac{S_{xy}}{S_{xx}}$

B. $\bar{y} - \hat{\beta}_1 \bar{x}$

Matching Items

✔ | B | 1. $\hat{\beta}_0$

✔   [A]   2. $\hat{\beta}_1$

Answer Key: 1:B, 2:A

Question 6 of 12

0.0 Points

The least squares estimators for the regression coefficients are called the best linear unbiased estimators (BLUE) as they are unbiased and have the minimum variance among all unbiased estimators that are linear combinations of the response variable.

✔   ○ True
    ○ False

Answer Key: True

Question 7 of 12

0.0 Points

Match the appropriate formulas below.

A. $\sum (y_i - \hat{y})^2$

B. $\sum (y_i - \bar{y})^2$

C. $\sum (\hat{y}_i - \bar{y})^2$

Matching Items

✔   [B]   1. SS_T

✔   [C]   2. SS_R

✔   [A]   3. SS_{res}

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

Question 8 of 12

0.0 Points

Consider the following statements regarding sum of squares in SLR. Which statement(s) is correct? Select all that apply.

✔   ☐ A. SS_T measures the total variability in the response variable for the data.

✔   ☐ B. SS_{res} measures the variability in the response variable that is unexplained by our regression.

✔   ☐ C. $SS_T = SS_r + SS_{res}$

✔   ☐ D. The estimated variance of the regression model is $\hat{\sigma^2} = MS_{res} = \frac{SS_{res}}{n-2}$

Answer Key: A, B, C, D

Question 9 of 12

0.0 Points

Consider the following statements regarding the ANOVA *F* test in SLR. Which statement(s) is correct? Select all that apply.

☐ A. The ANOVA *F* test tests if the response variable and predictor are linearly related.

✔ ☐ B. The ANOVA *F* test statistic follows the $F_{1,n-2}$ distribution in SLR.

Answer Key: A, B

Question 10 of 12

0.0 Points

What is the appropriate null and alternative hypotheses in an ANOVA *F* test?

- ✔ ◯ 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

Question 11 of 12

0.0 Points

What is the formula of the ANOVA *F* statistic?

- ✔ ◯ A. $F = \dfrac{MS_R}{MS_{res}}$

- ◯ B. $F = \dfrac{MS_R}{MS_T}$

- ◯ C. $F = \dfrac{SS_R}{SS_{res}}$

- ◯ D. $F = \dfrac{SS_R}{SS_T}$

Answer Key: A

Question 12 of 12

0.0 Points

Consider the following statements regarding the coefficient of determination, R^2. Which statement(s) is correct? Select all that apply.

✔ ☐ A. $R^2 = \frac{SS_R}{SS_T}$

☐

✔ B. R^2 measures the proportion of the variation in the response variable that can be explained by the predictor.

✔ ☐ C. $0 \leq R^2 \leq 1$

☐ D. When we add a predictor to a regression model, the R^2 could increase or decrease.

Answer Key: A, B, C

Feedback:

R^2 will never decrease when adding a predictor.

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