Reading 10

SIMPLE LINEAR REGRESSION

1. (C) the ratio of the covariance of the regression variables to the variance of the independent variable.

Explanation

The estimated slope coefficient in a simple linear regression is $\frac{Cov_{X,Y}}{\sigma_X^2}$, where Y is the dependent variable and X is the independent variable. The estimated slope coefficient is interpreted as the change in the dependent variable, given a one-unit change in the independent variable. The predicted value of the dependent variable must consider the estimated intercept term along with the estimated slope coefficient.

(Module 10.1, LOS 10.a)

2. (C) 5.83.

Explanation

Y = 2.83 + (1.5)(2) = 2.83 + 3 = 5.83.

(Module 10.3, LOS 10.e)

3. (B) the log-lin model.

Explanation

A regression of the form $\ln Y = b_0 + b_1 X$ is appropriate when the relative change in the dependent variable is a linear function of the independent variable.

(Module 10.3, LOS 10.f)

4. (A) 0.45.

Explanation

R^2 = sum of squares regression / sum of squares total = 556 / 1,235 = 0.45.

(Module 10.2, LOS 10.d)

5. (A) percentage of the variation in the dependent variable explained by the variation of the independent variable.

Explanation

The coefficient of determination for a linear regression describes the percentage of the variation in the dependent variable explained by the variation of the independent variable.

(Module 10.2, LOS 10.c)

6. (A) does not have a constant variance.

Explanation

Heteroskedasticity is the condition in which the variance of the residual term of a regression is not constant across all observations.

(Module 10.1, LOS 10.b)

7. (C) n – 2

Explanation

The degrees of freedom are n – 2 for a confidence interval around a predicted value.

(Module 10.3, LOS 10.e)

8. (B) The error terms from a regression are positively correlated.

Explanation

One assumption of linear regression is that the error terms are independently distributed. In this case, the correlations between error terms are expected to be zero. Constant variance of the error terms and no correlation between the independent variable and the error term are assumptions of linear regression.

(Module 10.1, LOS 10.b)

9. (B) one dependent variable and one independent variable.

Explanation

A simple linear regression is a model of the relationship between one dependent variable and one independent variable. A multiple regression is a model of the relationship between one dependent variable and more than one independent variable.

(Module 10.1, LOS 10.a)

10. (C) 27.87.

Explanation

F = sum of squares regression / mean squared error = 550 / 19.737 = 27.867.

(Module 10.2, LOS 10.d)

11. (C) either or both of the dependent and independent variables are logarithmic.

Explanation

A log-lin model is appropriate if the dependent variable is logarithmic, while the independent variable is linear. A lin-log model is appropriate if the independent variable is logarithmic, while the dependent variable is linear. A log-log model is appropriate if both the independent and dependent variables are logarithmic.

(Module 10.3, LOS 10.f)

12. (B) 0.774.

Explanation

We are given the coefficient of determination of 0.599 (R^2) and are asked to find the correlation coefficient (r), which is the square root of the coefficient of determination for a simple regression:

$\sqrt{0.599} = 0.774$

(Module 10.2, LOS 10.c)

13. (B) the predicted and actual values of the dependent variable.

Explanation

The least squares criterion defines the best-fitting linear relationship as the one that minimizes the sum of squared errors, the squared vertical distances between the predicted and actual values of the dependent variable.

(Module 10.1, LOS 10.a)