

## Solutions to Quiz 9 (version A & B)

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### Version A:

1. In simple linear regression model  $Y = \beta_0 + \beta_1 x + \varepsilon$ , which of the following statement is not a required assumption about the random error term  $\varepsilon$  ?
- A. The expected value of  $\varepsilon$  is zero.
  - B. The variance of  $\varepsilon$  is the same for all values of the independent variable  $x$ .
  - C. The error term is normally distributed.
  - D. The values of the error term are linearly dependent of one another.

**ANSWER: D**

2. A procedure used to estimate the regression parameters  $\beta_1$  and  $\beta_2$ , and to find the least squares line which provides the best approximation for the relationship between the explanatory variable  $x$  and the response variable  $Y$  is known as the
- A. least squares method
  - B. best squares method
  - C. regression analysis method
  - D. coefficient of determination method
  - E. prediction analysis method

**ANSWER: A**

3. The principle of least squares results in values of  $\hat{\beta}_0$  and  $\hat{\beta}_1$  that minimizes the sum of squared deviations between
- A. the observed values of the explanatory variable  $x$  and the estimated values  $\hat{x}$
  - B. the observed values of the response variable  $y$  and the estimated values  $\hat{y}$
  - C. the observed values of the explanatory variable  $x$  and the response variable  $y$
  - D. the observed values of the explanatory variable  $x$  and the response values  $\hat{y}$
  - E. the estimated values of the explanatory variable  $x$  and the observed values of the response variable  $y$

**ANSWER: B**

4. Which of the following statement is not correct?
- A. The coefficient of determination, denoted by  $R^2$  is interpreted as the proportion of observed  $y$  variation that cannot be explained by the simple linear regression model.
  - B. The higher the value of the coefficient of determination, the more successful is the simple linear regression model in explaining  $y$  variation.
  - C. The coefficient of determination can be calculated as the ratio of the regression sum of squares ( $SSR$ ) to the total sum of squares.

**ANSWER: A**

**Version B:**

5. In simple linear regression model  $Y = \beta_0 + \beta_1 x + \varepsilon$ , which of the following statement is not a required assumption about the random error term  $\varepsilon$ ?
- A. The values of the error term are linearly dependent of one another.
  - B. The expected value of  $\varepsilon$  is zero.
  - C. The variance of  $\varepsilon$  is the same for all values of the independent variable  $x$ .
  - D. The error term is normally distributed.

**ANSWER: A**

6. A procedure used to estimate the regression parameters  $\beta_1$  and  $\beta_2$ , and to find the least squares line which provides the best approximation for the relationship between the explanatory variable  $x$  and the response variable  $Y$  is known as the
- A. prediction analysis method
  - B. least squares method
  - C. best squares method
  - D. regression analysis method
  - E. coefficient of determination method

**ANSWER: B**

7. The principle of least squares results in values of  $\hat{\beta}_0$  and  $\hat{\beta}_1$  that minimizes the sum of squared deviations between
- A. the estimated values of the explanatory variable  $x$  and the observed values of the response variable  $y$
  - B. the observed values of the explanatory variable  $x$  and the estimated values  $\hat{x}$
  - C. the observed values of the response variable  $y$  and the estimated values  $\hat{y}$
  - D. the observed values of the explanatory variable  $x$  and the response variable  $y$
  - E. the observed values of the explanatory variable  $x$  and the response values  $\hat{y}$

**ANSWER: C**

8. Which of the following statement is not correct?
- A. The coefficient of determination can be calculated as the ratio of the regression sum of squares ( $SSR$ ) to the total sum of squares.
  - B. The coefficient of determination, denoted by  $R^2$  is interpreted as the proportion of observed  $y$  variation that cannot be explained by the simple linear regression model.
  - C. The higher the value of the coefficient of determination, the more successful is the simple linear regression model in explaining  $y$  variation.

**ANSWER: B**

**[2 points for attendance. 2 points for each question. Total is 10.]**