1. A dependent variable is also known as a(n) _____.

a. explanatory variable
b. control variable
c. predictor variable
d. response variable

ANSWER: d
RATIONALE: FEEDBACK: A dependent variable is known as a response variable.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Definition of the Simple Regression Model
KEYWORDS: Bloom's: Knowledge

2. If a change in variable *x* causes a change in variable *y*, variable *x* is called the _____.

a. dependent variable
b. explained variable
c. explanatory variable
d. response variable

ANSWER: c
RATIONALE: FEEDBACK: If a change in variable *x* causes a change in variable *y*, variable *x* is called the independent variable or the explanatory variable.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Definition of the Simple Regression Model
KEYWORDS: Bloom's: Comprehension

3. In the equation $y = \beta_0 + \beta_1 x + u$, β_0 is the _____.

a. dependent variable
b. independent variable
c. slope parameter
d. intercept parameter

ANSWER: d
RATIONALE: FEEDBACK: In the equation $y = \beta_0 + \beta_1 x + u$, β_0 is the intercept parameter.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Definition of the Simple Regression Model
KEYWORDS: Bloom's: Knowledge

4. In the equation $y = \beta_0 + \beta_1 x + u$, what is the estimated value of β_0?

a. $\bar{y} - \hat{\beta}_1 \bar{x}$
b. $\bar{y} + \beta_1 \bar{x}$

c. $\frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sum_{i=1}^{n}(x_i)^2}$

d. $\sum_{i=1}^{n} xy$

ANSWER: a

RATIONALE: FEEDBACK: The estimated value of β_0 is $\bar{y}-\hat{\beta}_1\bar{x}$.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Deriving the Ordinary Least Squares Estimates

KEYWORDS: Bloom's: Knowledge

5. In the equation $c=\beta_0+\beta_1 i+u$, *c* denotes consumption and *i* denotes income. What is the residual for the 5th observation if c_5=$500 and $\hat{c}_5$=$475?

a. $975
b. $300
c. $25
d. $50

ANSWER: c

RATIONALE: FEEDBACK: The formula for calculating the residual for the *i*th observation is $\hat{u}_1=y_i-\hat{y}_1$. In this case, the residual is $\hat{u}_5=c_5-\hat{c}_5=\$500-\$475=\$25.$

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Deriving the Ordinary Least Squares Estimates

KEYWORDS: Bloom's: Application

6. What does the equation $\hat{y}=\hat{\beta}_0+\hat{\beta}_1 x$ denote if the regression equation is $y=\beta_0+\beta_1 x_1+u$?

a. The explained sum of squares
b. The total sum of squares
c. The sample regression function
d. The population regression function

ANSWER: c

RATIONALE: FEEDBACK: The equation $\hat{y}=\hat{\beta}_0+\hat{\beta}_1 x$ denotes the sample regression function of the given regression model.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Deriving the Ordinary Least Squares Estimates

KEYWORDS: Bloom's: Knowledge

7. If x_i and y_i are positively correlated in the sample then the estimated slope is _____.

a. less than zero
b. greater than zero
c. equal to zero
d. equal to one

ANSWER: b

RATIONALE: FEEDBACK: If x_i and y_i are positively correlated in the sample then the estimated slope is greater than zero.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Deriving the Ordinary Least Squares Estimates

KEYWORDS: Bloom's: Knowledge

8. The sample correlation between x_i and y_i is denoted by _____.

a. $\hat{\beta}_1$
b. $\hat{\sigma}_x$
c. $\hat{\sigma}_y$
d. $\hat{\rho}_{xy}$

ANSWER: d

RATIONALE: FEEDBACK: The sample correlation between x_i and y_i is denoted by $\hat{\rho}_{xy}$.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Deriving the Ordinary Least Squares Estimates

KEYWORDS: Bloom's: Knowledge

9. Consider the following regression model: $y = \alpha_0 + \beta_1 x_1 + u$. Which of the following is a property of Ordinary Least Square (OLS) estimates of this model and their associated statistics?

a. The sum, and therefore the sample average of the OLS residuals, is positive.
b. The sum of the OLS residuals is negative.
c. The sample covariance between the regressors and the OLS residuals is positive.
d. The point $(\bar{x}, \bar{y})$ always lies on the OLS regression line.

ANSWER: d

RATIONALE: FEEDBACK: An important property of the OLS estimates is that the point $(\bar{x}, \bar{y})$ always lies on the OLS regression line. In other words, if $x = \bar{x}$, the predicted value of y is $\bar{y}$.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Properties of OLS on Any Sample of Data

KEYWORDS: Bloom's: Knowledge

10. The explained sum of squares for the regression function, $y_i = \beta_0 + \beta_1 x_1 + u_1$, is defined as _____.

a. $\sum_{i=1}^{n} (y_i - \bar{y})^2$

b. $\sum_{i=1}^{n} (y_i - \hat{y})^2$

c. $\sum_{i=1}^{n} \hat{u}_i$

d. $\sum_{i=1}^{n} (u_i)^2$

ANSWER: b

RATIONALE: FEEDBACK: The explained sum of squares is defined as $\sum_{i=1}^{n} (y_i - \hat{y})^2$.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Properties of OLS on Any Sample of Data

KEYWORDS: Bloom's: Knowledge

11. If the total sum of squares (SST) in a regression equation is 81, and the residual sum of squares (SSR) is 25, what is the explained sum of squares (SSE)?

a. 64

b. 56

c. 32

d. 18

ANSWER: b

RATIONALE: FEEDBACK: Total sum of squares (SST) is given by the sum of explained sum of squares (SSE) and residual sum of squares (SSR). Therefore, in this case, SSE=81-25=56.

POINTS: 1

DIFFICULTY: Moderate

NATIONAL STANDARDS: United States - BUSPROG: Analytic - BUSPROG: Analytic

TOPICS: Properties of OLS on Any Sample of Data

KEYWORDS: Bloom's: Application

12. If the residual sum of squares (SSR) in a regression analysis is 66 and the total sum of squares (SST) is equal to 90, what is the value of the coefficient of determination?

a. 0.73

b. 0.55

c. 0.27

d. 1.2

ANSWER: c

RATIONALE: FEEDBACK: The formula for calculating the coefficient of determination is $R^2 = 1 - \frac{SSR}{SST}$.

In this case, $R^2 = 1 - \frac{66}{90} = 0.27$.

POINTS: 1
DIFFICULTY: Moderate
NATIONAL STANDARDS: United States - BUSPROG: Analytic - BUSPROG: Analytic
TOPICS: Properties of OLS on Any Sample of Data
KEYWORDS: Bloom's: Application

13. Which of the following is a nonlinear regression model?

a. $y = \alpha_0 + \beta_1 x^{1/2} + u$

b. $\log y = \alpha_0 + \beta_1 \log x + u$

c. $y = 1 / (\alpha_0 + \beta_1 x) + u$

d. $y = \alpha_0 + \beta_1 x + u$

ANSWER: c
RATIONALE: FEEDBACK: A regression model is nonlinear if the equation is nonlinear in the parameters. In this case, $y = 1 / (\alpha_0 + \beta_1 x) + u$ is nonlinear as it is nonlinear in its parameters.
POINTS: 1
DIFFICULTY: Moderate
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Properties of OLS on Any Sample of Data
KEYWORDS: Bloom's: Comprehension

14. In a regression equation, changing the units of measurement of only the independent variable does not affect the _____.

a. dependent variable
b. slope
c. intercept
d. error term

ANSWER: c
RATIONALE: FEEDBACK: In a regression equation, changing the units of measurement of only the independent variable does not affect the intercept.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Units of Measurement and Functional Form
KEYWORDS: Bloom's: Knowledge

15. Which of the following is assumed for establishing the unbiasedness of Ordinary Least Square (OLS) estimates?

a. The error term has an expected value of 1 given any value of the explanatory variable.
b. The regression equation is linear in the explained and explanatory variables.
c. The sample outcomes on the explanatory variable are all the same value.
d. The error term has the same variance given any value of the explanatory variable.

ANSWER: d
RATIONALE: FEEDBACK: The error u has the same variance given any value of the explanatory variable.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Expected Values and Variances of the OLS Estimators
KEYWORDS: Bloom's: Knowledge

16. The error term in a regression equation is said to exhibit homoskedasticty if _____.
    a. it has zero conditional mean
    b. it has the same variance for all values of the explanatory variable
    c. it has the same value for all values of the explanatory variable
    d. if the error term has a value of one given any value of the explanatory variable

ANSWER: b
RATIONALE: FEEDBACK: The error term in a regression equation is said to exhibit homoskedasticty if it has the same variance for all values of the explanatory variable.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Expected Values and Variances of the OLS Estimators
KEYWORDS: Bloom's: Knowledge

17. In the regression of y on x, the error term exhibits heteroskedasticity if _____.
    a. it has a constant variance
    b. Var($y|x$) is a function of x
    c. x is a function of y
    d. y is a function of x

ANSWER: b
RATIONALE: FEEDBACK: Heteroskedasticity is present whenever Var($y|x$) is a function of x because Var($u|x$) = Var($y|x$).
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Expected Values and Variances of the OLS Estimators
KEYWORDS: Bloom's: Knowledge

18. What is the estimated value of the slope parameter when the regression equation, $y = \alpha_0 + \beta_1 x_1 + u$ passes through the origin?
    a. $\sum_{i=1}^{n} y_i$
    b. $\sum_{i=1}^{n} (y_i - \bar{y})$
    c. $\dfrac{\sum_{i=1}^{n} x_i y_i}{\sum_{i=1}^{n} x_i^2}$
    d. $\sum_{i=1}^{n} (y_i - \bar{y})^2$

ANSWER: c

RATIONALE: FEEDBACK: The estimated value of the slope parameter when the regression equation passes through the origin is $\frac{\sum_{i=1}^{n} x_i y_i}{\sum_{i=1}^{n} x_i^2}$.

POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Regression through the Origin and Regression on a Constant
KEYWORDS: Bloom's: Knowledge

19. A natural measure of the association between two random variables is the correlation coefficient.
    a. True
    b. False

ANSWER: True
RATIONALE: FEEDBACK: A natural measure of the association between two random variables is the correlation coefficient.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Definition of the Simple Regression Model
KEYWORDS: Bloom's: Knowledge

20. Simple regression is an analysis of correlation between two variables.
    a. True
    b. False

ANSWER: True
RATIONALE: FEEDBACK: Simple regression is an analysis of correlation between two variables.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Deriving the Ordinary Least Squares Estimates
KEYWORDS: Bloom's: Knowledge

21. The sample covariance between the regressors and the Ordinary Least Square (OLS) residuals is always positive.
    a. True
    b. False

ANSWER: False
RATIONALE: FEEDBACK: The sample covariance between the regressors and the Ordinary Least Square (OLS) residuals is zero.
POINTS: 1
DIFFICULTY: Easy
NATIONAL STANDARDS: United States - BUSPROG: Analytic
TOPICS: Properties of OLS on Any Sample of Data
KEYWORDS: Bloom's: Knowledge

22. R^2 is the ratio of the explained variation compared to the total variation.

a. True

b. False

ANSWER: True

RATIONALE: FEEDBACK: The sample covariance between the regressors and the Ordinary Least Square (OLS) residuals is zero.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Properties of OLS on Any Sample of Data

KEYWORDS: Bloom's: Knowledge

23. There are *n*-1 degrees of freedom in Ordinary Least Square residuals.

a. True

b. False

ANSWER: False

RATIONALE: FEEDBACK: There are n-2 degrees of freedom in Ordinary Least Square residuals.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Expected Values and Variances of the OLS Estimators

KEYWORDS: Bloom's: Knowledge

24. The variance of the slope estimator increases as the error variance decreases.

a. True

b. False

ANSWER: False

RATIONALE: FEEDBACK: The variance of the slope estimator increases as the error variance increases.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Expected Values and Variances of the OLS Estimators

KEYWORDS: Bloom's: Knowledge

25. In general, the constant that produces the smallest sum of squared deviations is always the sample average.

a. True

b. False

ANSWER: True

RATIONALE: FEEDBACK: In general, the constant that produces the smallest sum of squared deviations is always the sample average.

POINTS: 1

DIFFICULTY: Easy

NATIONAL STANDARDS: United States - BUSPROG: Analytic

TOPICS: Regression through the Origin and Regression on a Constant

KEYWORDS: Bloom's: Knowledge