File: Ch02, Chapter 2, The Simple Linear Regression Model

Multiple Choice

1. In an economic model that uses income to predict monthly expenditures on entertainment, what is the dependent variable?
a.) income
b.) monthly expenditures on entertainment
c.) income elasticity
d.) demand for entertainment

Ans: b
Level: Easy
Section: 2.1

2. In an economic model that uses income to predict monthly expenditures on entertainment, what is the independent or explanatory variable?
a.) income
b.) monthly expenditures on entertainment
c.) income elasticity
d.) demand for entertainment

Ans: a
Level: Easy
Section: 2.1

3. Which of the following is NOT an assumption of the Simple Linear Regression Model?
a.) The value of y, for each value of x, is
$y = \beta_1 + \beta_2 x + e$
b.)The variance of the random error e is
$\text{var}(e) = \sigma^2$
c.) The covariance between any pair of random errors e_i and e_j is zero
d.) The parameter estimate of β_1 is unbiased.

Ans: d
Level: Moderate
Section: 2.2

4. The OLS estimators for β_1 and β_2 are formulas derived by minimizing _____.
a.) the sum of the error terms or residuals

b.) the sum of the squared residuals
c.) the slope of the regression line
d.) the fit of the regression line to the observed data.

Ans: b
Level: Easy
Section: 2.3

5. Applying the OLS model to our data give us the following regression equation:

$$\hat{y} = 3.41 + 12.89\ x.$$

What would the forecast value be when the independent variable is 15.0?
a.) 196.76
b.) 16.30
c.) 244.50
d.) 32.19

Ans: a
Level: Easy
Section: 2.3

6. In the OLS model, what happens to var(b_1) as the sample size (N) increases?
a.) it also increases
b.) it decreases
c.) it does not change
d.) cannot be determined without more information

Ans: b
Level: Moderate/Difficult
Section: 2.4

7. If b_1 is an estimator for β_1 such that $E(b_1) = \beta_1$, then it must be the case that
a.) b_1 is an efficient estimator
b.) b_1 is an unbiased estimator
c.) b_1 is a linear estimator
d.) b_1 is a preferred estimator

Ans: b
Level: Moderate
Section: 2.4 & 2.5

8. Under the Gauss-Markov Theorem when assumptions SR1 – SR5 are met, what estimators of β_1 and β_2 may have smaller variances than b_1 and b_2?

a.) none
b.) a non-linear estimator
c.) a normally distributed estimator
d.) an estimator derived from economic theory

Ans: b
Level: Difficult
Section: 2.5

9. What mathematical theorem allows for normally distributed least squares estimators when assumptions SR1 – SR5 hold but the error term is NOT normally distributed?
a.) Central Limit Theorem
b.) Gauss-Markov Theorem
c.) Law of Large Numbers
d.) the Least Squares Principle

Ans: a
Level: Easy
Section: 2.6

10. If we use $\frac{\sum \hat{e}_i^2}{N}$ as an estimator of σ^2 it is _____, but it can be corrected by _____.
a.) biased, changing the numerator to $\sum e_i^2$
b.) non-linear, changing the denominator to N – 2
c.) biased, changing the denominator to N-2
d.) non-linear, taking the log of each term.

Ans: c
Level: Moderate
Section: 2.7

11. Which of the following non-linear adjustments CANNOT be accommodated using OLS?
a.) including an independent variable that has been raised to a power
b.) taking a logarithmic transformation of the dependent variable
c.) including a binary indicator variable
d.) raising parameters to a power

Ans: d
Level: Moderate
Section: 2.8

12. How do you interpret the estimated value of γ_1 in the following equation:

$\ln(ENT\_EXP) = \gamma_1 + \gamma_2 (INCOME) + e$

where *INCOME* is annual household income (in thousands) and *ENT_EXP* is annual entertainment expenses?

a.) the income elasticity of entertainment
b.) when multiplied by 100 it is the percentage increase in entertainment expenses associated with an additional $1000 in income
c.) the increase in entertain expenses associated with a 1% increase in income
d.) the average of the logarithm of entertainment expenses for a household with zero income

Ans: d
Level: Moderate
Section: 2.8

13. How do you interpret the estimated value of γ_2 in the following equation:

$\ln(ENT\_EXP) = \gamma_1 + \gamma_2 (INCOME) + e$

where *INCOME* is annual household income (in thousands) and *ENT_EXP* is annual entertainment expenses?

a.) the income elasticity of entertainment
b.) .) when multiplied by 100 it is the percentage increase in entertainment expenses associated with an additional $1000 in income
c.) the increase in entertain expenses associated with a 1% increase in income
d.) the average of the logarithm of entertainment expenses for a household with zero income

Ans: b
Level: Moderate
Section: 2.8

14. You have estimated the following equation using OLS:

$\hat{y} = 33.75 + 1.45\ MALE$

where y is annual income in thousands and *MALE* is an indicator variable such that it is 1 for males and 0 for females. According to this model, what is the average income for females?

a.) $33,750
b.) $35,200
c.) $32,300

d.) cannot be determined

Ans: a
Level: Easy
Section: 2.9

15. You have estimated the following equation using OLS:

$\hat{y} = 33.75 + 1.45\ MALE$

where y is annual income in thousands and *MALE* is an indicator variable such that it is 1 for males and 0 for females. According to this model, what is the average income for males?

a.) $33,750
b.) $35,200
c.) $32,300
d.) cannot be determined

Ans: b
Level: Easy
Section: 2.9