

Multiple Choice

1. When an error term is added to an economic model and assumptions about the distribution of the error term are made, the resulting model is _____.

- a.) fallacious, you should not make assumptions about error terms.
- b.) an econometric model that can be estimated and used for inference.
- c.) misspecified due to missing information.
- d.) heteroskedastic since error terms are no longer random.

Ans: b

2.) How should β_k in the general multiple regression model be interpreted?

- a.) The number of units of change in the expected value of y for a 1 unit increase in x_k when all remaining variables are unchanged
- b.) the magnitude by which x_k varies in the model
- c.) the amount of variation in y explained by x_k in the model
- d.) the number of variables used in the model.

Ans: a

3.) Which of the following is not an assumption of the multiple regression model?

- a.) The values of each x_{ik} are not random and are not exact linear functions of the other explanatory variables.
- b.) $\text{var}(y_i) = \text{var}(e_i) = \sigma^2$
- c.) The least squares estimators are BLUE.
- d.) $\text{cov}(y_i, y_j) = \text{cov}(e_i, e_j) = 0; \quad (i \neq j)$

Ans: c

4.) What is the unbiased estimator of σ^2 in the multiple regression model?

- a.) $\frac{\sum \hat{e}_i^2}{N}$
- b.) $\frac{\sum e_i^2}{K}$

c.) $\frac{\sum \hat{e}_i^2}{N - K}$

d.) $\frac{\sum e_i}{N - K}$

Ans: c

5.) Why does the denominator of $\hat{\sigma}^2$ need to be the same as the degrees of freedom in the model?

- a.) so we will know how the estimate is distributed if H_0 is true
- b.) so we can extrapolate the results to other values of x
- c.) so that the root MSE will be a positive number
- d.) so the estimator will be unbiased

Ans: d

6.) In the multiple regression model which of the following does NOT lead to larger variances of the least squares estimators b_2 and $\text{var}(b_2)$?

- a.) larger error variances, σ^2
- b.) larger correlation between x_2 and x_3
- c.) smaller values of $\sum (x_{i2} - \bar{x}_2)^2$
- d.) larger correlation between x_2 and y

Ans: d

7.) The matrix below represents the variance-covariance matrix estimated from the multiple regression model:

$$\begin{bmatrix} A & B & C \\ D & E & F \\ G & H & I \end{bmatrix}$$

Which 2 elements of the matrix should always be equal?

- a.) A & I
- b.) B & H
- c.) C & G
- d.) D & F

Ans: c

8.) The matrix below represents the variance-covariance matrix estimated from the multiple regression model:

$$\begin{bmatrix} A & B & C \\ D & E & F \\ G & H & I \end{bmatrix}$$

Which element of the matrix cannot be negative?

- a.) A
- b.) B
- c.) C
- d.) D

Ans: a

9.) You have estimated a multiple regression model with 6 explanatory variables and an intercept from a sample with 46 observations. What is t_c if you want to perform a right-tailed hypothesis test at the .01 level of significance?

- a.) 2.426
- b.) 2.708
- c.) 2.423
- d.) 2.704

Ans: a

10.) You estimate a model with 5 explanatory variables and an intercept from a data set with 247 observations. To test hypotheses on this model you should use a t distribution with how many degrees of freedom?

- a.) 242
- b.) 120
- c.) ∞
- d.) 241

Ans: d

11. A model estimated using a dataset with 125 observations generates the following results.

Variable	β	Std. Error	t	P> t
x ₂	-0.01264	0.005519	-2.28937	0.022
x ₃	0.595792	0.014482	41.13934	0.000
x ₄	1.124589	0.877192	1.282032	0.200
x ₅	0.323742	0.060709	5.332661	0.000
Constant	8.86016	1.766116	5.016749	0.000

What are the endpoints for the 95% confidence interval for β_3 ?

- a.)(-0.6842, 1.8758)
- b.)(-1.3842, 2.5758)
- c.)(0.5672, 0.6245)
- d.)(-40.5435 , 41.7251)

Ans: c

12.) A model estimated using a dataset with 65 observations generates the following results.

Variable	β	Std. Error	t	P> t
x ₂	-0.01264	0.005519	-2.28937	0.022
x ₃	0.595792	0.014482	41.13934	0.000
x ₄	1.124589	0.877192	1.282032	0.200
x ₅	0.323742	0.060709	5.332661	0.000
Constant	8.86016	1.766116	5.016749	0.000

What are the endpoints for the 99% confidence interval for β_5 ?

- a.) (0.1623, 0.4852)
- b.) (-5.0089 , 5.6564)
- c.) (0.2630 , 0.3845)
- d.) (0.1786 , 0.4688)

Ans: a

14.) A model estimated using a dataset with 65 observations generates the following results.

Variable	β	Std. Error	t	P> t
x ₂	-0.01264	0.005519	-2.28937	0.022
x ₃	0.595792	0.014482	41.13934	0.000
x ₄	1.124589	0.877192	1.282032	0.200
x ₅	0.323742	0.060709	5.332661	0.000
Constant	8.86016	1.766116	5.016749	0.000

If you want to test the hypothesis that $\beta_3 = 0.45$, what is the test statistic from this sample?

- a.) 41.139
- b.) 10.067
- c.) 31.072
- d.) 0.000

Ans: b

15. A model estimated using a dataset with 125 observations generates the following results.

Variable	β	Std. Error	t	P> t
x ₂	-0.01264	0.005519	-2.28937	0.022
x ₃	0.595792	0.014482	41.13934	0.000
x ₄	1.124589	0.877192	1.282032	0.200
x ₅	0.323742	0.060709	5.332661	0.000
Constant	8.86016	1.766116	5.016749	0.000

If you want to test the hypothesis $\beta_5 = .47$. What p-value does this test statistic generate if you are performing a two-tailed test?

- a.) 0.000
- b.) ≈ 0.02
- c.) ≈ 0.01
- d.) 0.05

Ans: b

15.) A model estimated using a dataset with 125 observations generates the following results.

Variable	β	Std. Error	t	P> t
x ₂	-0.01264	0.005519	-2.28937	0.022
x ₃	0.595792	0.014482	41.13934	0.000
x ₄	1.124589	0.877192	1.282032	0.200
x ₅	0.323742	0.060709	5.332661	0.000
Constant	8.86016	1.766116	5.016749	0.000

What test statistic would you use to test the hypothesis $\beta_5 \geq .25$?

- a.) 1.2147
- b.) 5.3327
- c.) 1.2948
- d.) 0.0607

Ans: a

16.) How can you estimate non-linear function forms using least squares?

- a.) estimate the linear approximation over small ranges at a time
- b.) transform, such as squaring or cubing, some explanatory variables.
- c.) use a very large sample so you do not have to assume the error terms are normally distributed

d.) It cannot be done. You need to use another estimation technique.

Ans: b

17.) If you have the following economic model

$$y = \beta_1 + \beta_2 x - \beta_3 x^2$$

What is dy/dx ?

- a.) β_2
- b.) $\beta_3 + \beta_2$
- c.) $\beta_2 - 2\beta_3 x$
- d.) $\beta_1 + 2\beta_2$

Ans: c

17. You have the following economic model

$$y = \beta_1 + \beta_2 x + \beta_3 x^2$$

If β_2 is positive and β_3 is negative what is the general shape of $F(x)$?

- a.) U-shape
- b.) Inverted U
- c.) Sigmoid
- d.) rectangular hyperbola

Ans: b

18. What is an interaction term?

- a.) an additional variable that is the product of 2 other explanatory variables
- b.) a variable indicating 2 observations are related
- c.) a variable indicating an observation may be in the dataset multiple times
- d.) the expected value formed by multiplying a variable by its estimated coefficient.

Ans: a

19.) A model estimated using a dataset with 125 observations generates the following results.

	SS	df	MS
Regression	919587.543	4	229896.9
Error	2590390.62	121	534.2113

Variable	β	Std.	t	$P > t $
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		Error		
x ₂	-0.0126355	0.005519	-2.28937	0.022
x ₃	0.5957923	0.014482	41.13934	0.000
x ₄	1.124589	0.877192	1.282032	0.200
x ₅	0.3237421	0.060709	5.332661	0.000
constant	8.86016	1.766116	5.016749	0.000

What is the R^2 for this sample?

- a.) .2620
- b.) .3550
- c.) .0888
- d.) .2172

Ans: a