

Questions 5 - 6 refer to the following information:

Consider the following estimated regression equation:

$$\hat{Y}_i = 2.22 - 0.25X_{1i} + 0.76X_{2i} + 0.03X_{3i}, \quad i = 1, \dots, n, \quad \text{where}$$

Y is the quantity demanded of "Good 1," X₁ is the price of "Good 1," X₂ is the price of "Good 2," and X₃ is income.

5. This equation:

- (a) is nonlinear in the estimated coefficients.
- (b) is linear in both the dependent variable and the independent variables.**
- (c) is linear in the dependent variable, but nonlinear in the independent variables.
- (d) has four independent variables.
- (e) could not have been estimated by OLS.

6. Assume that, for $i=4$, $Y_i = 4.789$, $X_{1i} = 1.5$, $X_{2i} = 0.75$, and $X_{3i} = 100$. Then (rounding off to the third decimal place):

- (a) $e_4 = 0.262$
- (b) $e_4 = -0.626$**
- (c) $e_4 = 0.543$
- (d) $e_4 = -0.435$
- (e) $e_4 = 0.923$

7. Which of the following statements is TRUE for all observations?

- (a) we never observe the values of a true regression model's stochastic error terms.**
- (b) we never observe the values of an estimated regression model's residuals.
- (c) if the residuals for some observation is negative, the residual for the next observation is also be negative.
- (d) if the stochastic error term for some observation is positive, the residual for that observation is also positive.
- (e) Both (b) and (d) are true statement.

8. Consider the following regression equation estimated by OLS:

$$\hat{Y}_i = 3.12 + 1.24X_{1i} - 8.73X_{2i} + 4.44X_{3i} + 3.28X_{4i}, \quad i = 1, \dots, 43.$$

There are degrees of freedom for this model.

- (a) 37
- (b) 38**
- (c) 39
- (d) 40
- (e) 41

9. The goal of OLS is to find the values of the estimated parameters which:

- (a) maximize the sum of the squared stochastic error terms.
- (b) minimize the sum of the squared stochastic error terms.
- (c) maximize the sum of the squared residuals.
- (d) minimize the sum of the squared residuals.**
- (e) Both (a) and (c) are correct answers.

10. For a model's parameters to be estimated by OLS:

- (a) the model must be nonlinear in the parameters.
- (b) the model must be linear in the parameters.**
- (c) the model must be nonlinear in the variables.
- (d) the model must linear in the variables.
- (e) Both (a) and (d) are correct answers.

Question #2 (10 Points):

Consider the following regression equation for the Gaza Strip (standard errors in parentheses):

$$\hat{C}_t = 4.00 - 0.010\text{PRC}_t + 0.030\text{PRB}_t + 0.20\text{YD}_t$$

(0.005) (0.020) (0.04)

$$\bar{R}^2 = 0.98 \quad n = 29$$

where: C_t = per capita pounds of chicken consumed in time period t

PRC_t = the price of chicken in time period t

PRB_t = the price of beef in time period t

YD_t = per capita disposable income in time period t

- (a) **(3 Points)** Hypothesize signs and specify the appropriate null and alternative hypotheses for the coefficients of each of these variables.

Coefficient	β_{PRC}	β_{PRB}	β_{YD}
Hypothesized sign	-	+	+

- (b) **(4 Points)** State your decision rules and then test your hypotheses on the above results using the t -test at a 5% level of significance.

Calculated t -score -2.0 +1.5 +5.0
the critical t -value for a 5% one-sided test with 25 d.f. is 1.708, so
reject
do not reject
reject

- (c) **(3 Points)** If you could add two variables to the regression, what variables would you add? Why?

The two most important criteria are whether or not the suggested variable is a time series variable and whether or not that variable can be measured. "Tastes," for example, are important but hard to measure.

TABLE B-1 CRITICAL VALUES OF THE t-DISTRIBUTION

Degrees of Freedom	Level of Significance					
	One Sided: Two Sided:	10% 20%	5% 10%	2.5% 5%	1% 2%	0.5% 1%
1		3.078	6.314	12.706	31.821	63.657
2		1.886	2.920	4.303	6.965	9.925
3		1.638	2.353	3.182	4.541	5.841
4		1.533	2.132	2.776	3.747	4.604
5		1.476	2.015	2.571	3.365	4.032
6		1.440	1.943	2.447	3.143	3.707
7		1.415	1.895	2.365	2.998	3.499
8		1.397	1.860	2.306	2.896	3.355
9		1.383	1.833	2.262	2.821	3.250
10		1.372	1.812	2.228	2.764	3.169
11		1.363	1.796	2.201	2.718	3.106
12		1.356	1.782	2.179	2.681	3.055
13		1.350	1.771	2.160	2.650	3.012
14		1.345	1.761	2.145	2.624	2.977
15		1.341	1.753	2.131	2.602	2.947
16		1.337	1.746	2.120	2.583	2.921
17		1.333	1.740	2.110	2.567	2.898
18		1.330	1.734	2.101	2.552	2.878
19		1.328	1.729	2.093	2.539	2.861
20		1.325	1.725	2.086	2.528	2.845
21		1.323	1.721	2.080	2.518	2.831
22		1.321	1.717	2.074	2.508	2.819
23		1.319	1.714	2.069	2.500	2.807
24		1.318	1.711	2.064	2.492	2.797
25		1.316	1.708	2.060	2.485	2.787
26		1.315	1.706	2.056	2.479	2.779
27		1.314	1.703	2.052	2.473	2.771
28		1.313	1.701	2.048	2.467	2.763
29		1.311	1.699	2.045	2.462	2.756
30		1.310	1.697	2.042	2.457	2.750
40		1.303	1.684	2.021	2.423	2.704
60		1.296	1.671	2.000	2.390	2.660
120		1.289	1.658	1.980	2.358	2.617
(Normal) ∞		1.282	1.645	1.960	2.326	2.576