

FINAL EXAMINATION ANSWER KEY
May 13, 2008

VERSION A

I. MULTIPLE CHOICE: [1 pts each—6 pts total]

(1)a. (2)b. (3)a. (4)e. (5)a. (6)d.

II. MULTIPLE ANSWER:

- (1) a. No. b. No. c. Yes. d. Yes. e. Yes. f. No.
(2) a. Yes. b. No. c. No. d. No. e. No.

III. PROBLEMS:

(1) [LS confidence intervals, tests, elasticity: 24 pts]

- a. 77.6. b. 6.4. c. 0.4. d. $45.6 \pm 4.9 = (40.7, 50.5)$.
e. test statistic = 6.4, critical point = 1.645, reject null hypothesis.

(2) [Analysis of variance table, R^2 , F-test: 20 pts]

- a. 33. b. 5. c. 4. d. 0.3 e. 0.2
f. DOF in numerator = 4, DOF in denominator = 28
test statistic = 3.0, critical point = 2.71, reject null hypothesis.

(3) [Heteroskedasticity: 12 pts]

- a. No. b. Yes. c. Negatively. d. 4.3 e. 3.84.
f. Reject null hypothesis.

(4) [Breusch-Godfrey test: 10 pts]

- a. LS residual $\hat{\varepsilon}_t$. b. $x_t, y_{t-1}, \hat{\varepsilon}_{t-1}$. c. 4.65.
d. 3.84. e. Reject null hypothesis.

(5) [Forecasting, forecast interval: 12 pts]

- a. No, do not transform dependent variable.
b. Yes: $\tilde{x}_{t-1} = x_{t-1} - 33$ and $\tilde{y}_{t-1} = y_{t-1} - 48$.
c. 65.0. d. 7.0. e. $65 \pm 13.72 = (51.28, 78.72)$.

IV. CRITICAL THINKING

This is *not* evidence that televisions cause cancer. This is an example of *spurious regression*. The positive sample correlation arises because *both variables have upward trends*, partly because the population of the United States has increased during this period. Better ways to estimate the regression equation using these time-series data include any of the following.

- Put both variables in per-capita terms:

$$\left(\frac{\text{Cancer cases}}{\text{Population}} \right)_t = \beta_1 + \beta_2 \left(\frac{\text{Television s sold}}{\text{Population}} \right)_t + \varepsilon_t .$$

- Include a trend term: $\text{cancer cases}_t = \beta_1 + \beta_2 \text{television s sold}_t + \beta_3 \text{time trend}_t + \varepsilon_t$
- Estimate a purely short-run relationship: $\Delta \text{cancer cases}_t = \beta_1 + \beta_2 \Delta \text{television s sold}_t + \varepsilon_t$

VERSION B

I. MULTIPLE CHOICE: [1 pts each—6 pts total]

(1)c. (2)b. (3)d. (4)a. (5)c. (6)a.

II. MULTIPLE ANSWER:

- (1) a. Yes. b. Yes. c. Yes. d. No. e. No. f. No.
(2) a. Yes. b. No. c. No. d. No. e. No.

III. PROBLEMS:

(1) [LS confidence intervals, tests, elasticity: 24 pts]

- a. 78.0. b. 3.9. c. 0.25. d. $58.5 \pm 6.86 = (51.64, 65.36)$.
e. test statistic = 3.25, critical point = 1.645, reject null hypothesis.

(2) [Analysis of variance table, R^2 , F-test: 20 pts]

- a. 23. b. 3. c. 13. d. 0.409. e. 0.35
f. DOF in numerator = 2, DOF in denominator = 20
test statistic = 6.9231, critical point = 3.49, reject null hypothesis.

(3) [Heteroskedasticity: 12 pts]

- a. No. b. Yes. c. Negatively. d. 4.6 e. 3.84.
f. Reject null hypothesis.

(4) [Breusch-Godfrey test: 10 pts]

- a. LS residual $\hat{\varepsilon}_t$. b. $x_t, y_{t-1}, \hat{\varepsilon}_{t-1}$. c. 4.77.
d. 3.84. e. Reject null hypothesis.

(5) [Forecasting, forecast interval: 12 pts]

- a. No, do not transform dependent variable.
b. Yes: $\tilde{x}_{t-1} = x_{t-1} - 14$ and $\tilde{y}_{t-1} = y_{t-1} - 17$.
c. 37.0. d. 5.0. e. $37 \pm 9.8 = (27.2, 46.8)$.

IV. CRITICAL THINKING

Same as Version A.

VERSION C

I. MULTIPLE CHOICE: [1 pts each—6 pts total]

(1)d. (2)a. (3)c. (4)d. (5)b. (6)c.

II. MULTIPLE ANSWER:

- (1) a. No. b. Yes. c. Yes. d. Yes. e. No. f. No.
(2) a. Yes. b. No. c. No. d. No. e. No.

III. PROBLEMS:

- (1) [LS confidence intervals, tests, elasticity: 24 pts]
a. 76.56. b. 4.8. c. 0.27. d. $52.56 \pm 6.272 = (46.288, 58.832)$.
e. test statistic = 3.0, critical point = 1.645, reject null hypothesis.
- (2) [Analysis of variance table, R^2 , F-test: 20 pts]
a. 28. b. 4. c. 2. d. 0.556 e. 0.5
f. DOF in numerator = 3, DOF in denominator = 24
test statistic = 10.0, critical point = 3.01, reject null hypothesis.
- (3) [Heteroskedasticity: 12 pts]
a. Yes. b. No. c. Positively. d. 3.1 e. 3.84.
f. Cannot reject null hypothesis.
- (4) [Breusch-Godfrey test: 10 pts]
a. LS residual $\hat{\epsilon}_t$. b. $x_t, y_{t-1}, \hat{\epsilon}_{t-1}$. c. 2.88.
d. 3.84. e. Cannot reject null hypothesis.
- (5) [Forecasting, forecast interval: 12 pts]
a. No, do not transform dependent variable.
b. Yes: $\tilde{x}_{t-1} = x_{t-1} - 18$ and $\tilde{y}_{t-1} = y_{t-1} - 53$.
c. 47.0. d. 6.0. e. $47 \pm 11.76 = (35.24, 58.76)$.

IV. CRITICAL THINKING

Same as Version A.

[end of answer key]