Econometrics II
Autocorrelation

On the web page you will find a file titled AUTOCORR.DAT which contains 48 months of data on total revenue, cost and output for   Chez Buck, a hamburger chain. The chain's total revenue and total cost functions are given by

$$\text{tr} = \beta_1 q + \beta_2 q^2$$

$$\text{tc} = \alpha_1 + \alpha_2 q + \alpha_3 q^2$$

1. Find the profit maximizing output level as a function of the unknown parameters.

2.   Comment on the economic assumptions and model implicit in this specification.

3. Use OLS to estimate the unknown parameters.
     a.   Are the coefficients individually and severally different from zero?
     b.   Use your results to calculate the profit maximizing level of output.

4.   What is the correct covariance matrix for the OLS estimator when autocorrelaton goes uncorrected. Does your computer package give you this matrix or something else?

5.   Separately test the residuals for each of the functions to see if these errors might be   autocorrelated. Use the   Durbin-Watson test, Breusch-Godfrey, and the Q-statistic.

6. Reestimate the model correcting for   autocorrelation. Compute the new profit maximizing level of output.

7. What is the simple correlation between quantity and its square? What does this suggest to you about the significance tests for the coefficients in the earlier parts of the problem?

8.   Derive the marginal revenue and marginal cost functions from the model in question 1.
     a. Use your data to estimate the parameters for these functions.
     b. Are your coefficient estimates any sharper?

9.   In the earlier parts of the problem you estimated a total of four regression coefficients from 48 observations. If you subtract total cost from total revenue you can then proceed and estimate only two   paramters from 48 observations. Do so.   Are you able to estimate the relevant

coefficients with greater precision? Does it make any difference in your
confidence in finding the profit maximizing level of output.