Homework #2

INSTRUCTIONS: Please submit computer output with your answers. For the empirical exercises, ECON 424 students may use the SAS Analyst menus or SAS programming, but ECON 524 students must generate the SAS code and submit copies of the log files along with the output and answers. The deadline is Wednesday, October 22.

1. Download Data for Homework 2 from my website. The variables in the data set are for the U.S. brewing industry from 1953-2000. The definitions of the variables are listed below in order of their placement in the data set.

   YEAR = year of observation
   output (Q) = industry output in thousands of barrels (1 barrel=31 gallons)
   price (P) = nominal price of beer per barrel
   consumer price index (CPI), 1982 = 100

   Create a new variable, real price of beer (RPRICE) by deflating the nominal price with the CPI. That is, RPRICE = P/CPI. Calculate the means, minimum values and maximum values of YEAR, P, Q, CPI, and RPRICE. (Be sure to check for unreasonable values which might indicate errors in the data or program.)

2. a. Estimate the following beer demand function using regression analysis.

   \[ Q_t = \beta_1 + \beta_2 RPRICE_t + e_t \]

   b. Write down the estimated regression equation based on the SAS output.
   c. Using SAS, plot a scatter diagram with RPRICE on the horizontal axis and Q on the vertical axis. Sketch in the estimated regression line from above.
   d. Interpret the estimated value of \( \beta_2 \) (i.e., \( b_2 \)) verbally. Be sure to use the proper units for price and quantity. Does the estimate indicate that the Law of Demand holds for brewing?
   e. Without using the computer, calculate the estimated error term for 1975.
   f. Calculate the price elasticity of the estimated demand for beer from (a) above, evaluated at the means from problem (1).

3. a. In SAS, define the logarithm of output (lnQ) and the logarithm of real price (lnRP). Estimate a regression of lnQ on lnRP, i.e., \( \ln Q_i = \alpha_1 + \alpha_2 R_{P_i} + e_i \)
   b. Calculate the elasticity of demand, based on your estimates, evaluated at sample means.

4. Given equations 3.3.7a and 3.3.7b in the text, derive equations 3.3.8a and 3.3.8b.

5. All students: do text problem 3.13 (a)-(e). ECON 524 students also do part (f).