Exercise 2

Ozark Bottled Water Products, Inc. hired a marketing consulting firm to perform a  
test marketing of its new brand of spring water called Liquid Ozarka. The marketing experts selected 15 small and medium-sized towns in Arkansas and Missouri for a one-month-long sales test. For one month, Liquid Ozarka was sold at a variety of prices ranging from $3 per gallon to $4 per gallon. Specifically, in three of the markets, price was set by the marketing experts at $3 per gallon. In  
three more markets, price was set at $3.25 per gallon, and so on. The prices charged in each market (P) are shown in the table below. For each of the 15 market areas, the marketing consultants collected data on average household income (M), the population of the marketing area (N), and the price of a rival brand of bottled

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| Market P M PR N Q |
|  |
| 1 $3.00 $45,586 $2.75 274,000 7,952 |
| 2 3.00 37,521 3.50 13,450 8,222 |
| 3 3.00 41,333 2.64 54,150 7,166 |
| 4 3.25 47,352 2.35 6,800 6,686 |
| 5 3.25 51,450 2.75 11,245 7,715 |
| 6 3.25 27,655 3.15 54,500 6,643 |
| 8 3.50 39,542 3.00 158,000 7,127 |
| 9 3.50 41,596 2.75 22,500 5,834 |
| 10 3.75 42,657 2.45 46,150 5,093 |
| 11 3.75 36,421 2.89 8,200 5,828 |
| 12 3.75 47,624 2.49 38,500 6,590 |
| 13 4.00 50,110 3.15 105,000 6,228 |
| 14 4.00 57,421 2.80 92,000 7,218 |
| 15 4.00 38,450 2.90 38,720 5,846 |

Using the marketing data from the 15 test markets shown above, estimate the  
parameters of the linear empirical demand function:  
Q = a + bP + cM + dPR + eN  
If any of the parameter estimates are not significant at the 2 percent level of  
significance, drop the associated explanatory variable from the model and estimate  
the demand function again.

1. Your estimated linear demand function for Liquid Ozarka is  
   ˆQ= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. What percentage of the variation in sales of Liquid Ozarka is explained by  
   your estimated demand function?

The marketing consultants describe a “typical” market as one in which the price of Liquid Ozarka is $3.50 per gallon, average household income is $45,000, the price of rival bottled water is $3 per gallon, and the population is 75,000. Answer the following questions for this “typical” market scenario

1. What is the estimated elasticity of demand for Liquid Ozarka? Is demand  
   elastic or inelastic? What would be the percentage change in price required  
   to increase sales of Liquid Ozarka by 10 percent?
2. What is the estimated income elasticity of demand? Is Liquid Ozarka a  
   normal or inferior good? A 6 percent increase in average household income  
   would be predicted to cause what percentage change in sales of Liquid  
   Ozarka?
3. What is the estimated cross-price elasticity of demand for Liquid Ozarka  
   with respect to changes in price of its rival brand of bottled water? Does the  
   estimated cross-price elasticity have the expected algebraic sign? Why or  
   why not? If the price of the rival brand of water rises by 8 percent, what is  
   the estimated percentage change in sales of Liquid Ozarka?   
   Using the marketing data from the preceding 15 test markets, estimate the  
   parameters for the log-linear empirical demand function: *Q* = *aP*b*M*c*PR*d*N*e

If any of the parameter estimates are not significant at the 2 percent level of  
significance, drop the associated explanatory variable from the model and estimate  
the demand function again.

1. Your estimated log-linear demand function for Liquid Ozarka is  
   ˆQ= \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Does a log-linear specification work better than a linear specification of demand for Liquid Ozarka? Explain by comparing F-ratios, R2s, and t-ratios (or p-values).
3. Using the estimated log-linear demand function, compute the price, income, and cross-price elasticities of demand. How do they compare to the estimated  
   elasticities for the linear demand specification?