Problem Set #3  

Bruce Brown, Economics 1 (Microeconomic Principles), SMC

Students should understand how to calculate and interpret elasticities. The formula on the bottom of page 96 of the textbook may be used, but I find it easier to remember *Price Elasticity of Demand* as:

\[
\frac{\text{percentage change in quantity demanded}}{\text{percentage change in price}} = \frac{\% \Delta Q^D}{\% \Delta P} = \frac{\Delta Q^D / Q_{\text{average}}}{\Delta P / P_{\text{average}}} = \frac{\Delta Q^D \cdot P_{\text{average}}}{\Delta P \cdot Q_{\text{average}}}
\]

Note more advanced economics classes use a slightly different method to calculate “point” elasticities, rather than the “arc” elasticities we use in this class. Realize our method of calculating percent change (% Δ) uses average rather than “initial” values – see question # 2.

1. **True or False?**
   i) If X and Y are substitutes the cross price elasticity of demand (for good X with respect to the price of Y) must be negative.
   ii) If demand is inelastic a rightward shift in supply will cause a large fall in price and decrease total expenditure of buyers (= total revenue to sellers).
   iii) If demand is elastic a leftward shift in supply will cause an increase in total expenditure of buyers (= total revenue to sellers).
   iv) *price elasticity of demand* is defined as the percent change in the amount spent on a good divided by the percent change in that goods price.
   v) *price elasticity of demand* is equal to the negative of the slope of a demand curve.
   vi) *income elasticity of demand* is defined as the percent change in quantity demanded divided by the percent change in income.

2. a) Realize that when we define a % change in P or Q we want to get the same answer when considering a price increase (and so Q decrease), as when we are considering a price decrease (Q increase) along the same segment of a demand curve.
   Suppose P falls from 10 to 6 $/unit and Q increases from 50 to 70 units. What is our calculated % change in P using the midpoint method? What would be the % change in Q using the midpoint method? What is the *Price Elasticity of Demand* between these two points?

b) The reasoning above in (2a) implies the definition of “percent change” we use to find elasticities differs from that commonly used outside of this course. Compare the standard measure of % change (return on investment) with the midpoint method used in this course, in the following two examples:
   i) You put $100 in the bank 1/1/2001 and get back $110 on 1/1/2002.
   ii) You put $110 in the bank 1/1/2001 and get back $100 on 1/1/2002.

3. What are definitions for: i) Price Elasticity of Demand; ii) Income Elasticity of Demand; iii) Cross Price Elasticity; and iv) Price Elasticity of Supply?

4. Assume demand for bus rides is “unit elastic” for the range of prices considered. How will an increase in the bus fare affect total revenue of the bus company (= total expenditure by all bus riders)?