Economics 105 Mike Lovell
Due: Monday, September 18, 2000, 11:00 September 8, 2000

Problem Set #2 Demand and Supply

SAFETY NET!
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In Problem Set #1 we learned that a firm producing two commodities X and Y must produce at a point on the production transformation curve where the Marginal Rate of Transformation equals p_x/p_y if it wishes to maximize revenue (this would be equivalent to maximizing profits only if there were no raw material or labor costs). In this exercise we will find out how prices are determined in a competitive marketplace. Problem set 2b will consider taxes.

Before starting this exercise you must read:
Course Packet Chapter 3: Supply and Demand: Where do Prices Come From

1. The Market Place

There are 400 widgit consumers and 100 widget producers in Never-Never Land. Each of the 400 consumers has demand curve

$$q_i = 100 - p/4$$

Each producer has supply curve

$$s_i = 4(p- 5),\ p > 5$$

a. Determine the equations for *market* demand and market supply. Plot them on a neat graph (please use graph paper)
b. Is the equilibrium price \$79, \$84, or \$316? Find the equilibrium quantity that will be sold in this market.
c. Determine the (point) elasticity of demand at the equilibrium point.

2. Taxes

a. What would happen to quantity sold and the price paid by consumers if the governor imposes a \$25 tax on each widgit sold in Never-Never Land?
b. Find the inverse demand and supply functions for the widgit industry. Then determine how large an excise tax would just suffice to drive all the widgit manufactures out of business?
c. Determine the excise tax that would maximize the total tax revenue collected by the governor.
Hint: Consider equation 35 of chapter 3.
d. How much tax will be collected if the revenue maximizing tax is imposed. Show on your graph the tax revenue, the reduction in consumer surplus, the reduction in producer surplus and the dead weight loss resulting from the tax.

3. Price Supports (Forget about the taxes)

a. How much excess supply would there be if the government enforced a law prohibiting the sale of widgets at any price below \$100.

b. How many widgets would the government have to buy in order to push the price up to $100.

4. Trade (Forget about taxes and price supports.)

a. Suppose that importers bring widgets in from aboard and sell them for $50, which is the world price plus shipping costs. What will happen to the widgit market (domestic production, total sales, imports, prices)? Explain. Suggestion: redraw your original graph and show what happens.

b. How would trade be affected if the government placed a $20 tariff on widgets? How much revenue would the government collect?

5. Elasticity

a. An economist has estimated that a 10% increase in the price of cigarettes would cause a 12% reduction in smoking by high school seniors. What is the elasticity of high-school student demand for cigarettes?

b. Verify that the demand curve $q = 1000/p$ has unit elasticity ($\eta = 1$) at *every* price!

c. The demand for oranges is $q = 100 - 10p + 20y$, where p is price and y is income. Determine $\partial q/\partial p$ and $\partial q/\partial y$. Then solve for the price and income elasticity of demand.

d. The demand for apples is $q = 100y^{0.5}p^{-2}$. Determine $\partial q/\partial p$ and $\partial q/\partial y$. Then solve for the price and income elasticity of demand.

e. Two demand curves are plotted on each of the following graphs. On Figure 1, determine the elasticities for each curve when the quantity sold is 2. Then determine on Figure 2 the elasticity of demand at when the price is $4.00. Explain.

Figure 1

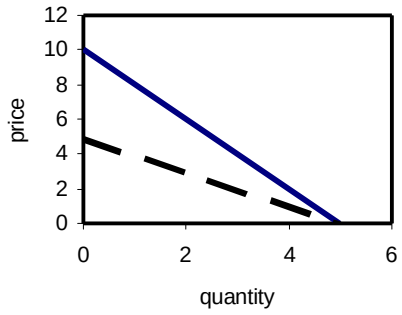
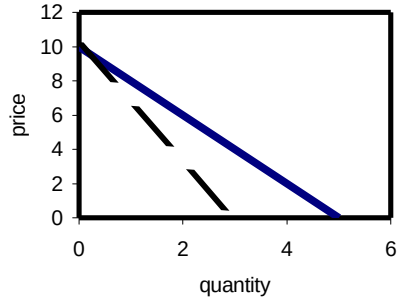


Figure 2



Hint: Use the quick trick explained on Figure 3.14

Honors Option:

1. The Marketing Manager for a software company reports that the demand elasticity is 0.6 at the price he has set for their product. The President fires him on the spot because he is obviously not maximizing profits. Explain how the president knew that profits were not being maximized.
2. Which parameters (coefficients) determine the revenue maximizing tax you calculated in question 2? Explain.
3. Suppose the income elasticity of demand for electricity is 1.9. If income per capita grows at 2% per annum, by what percentage per annum will the demand for electricity grow? Estimate the percentage increase in the per capita consumption of electricity that will take place between now and 2010.