Economics 201 **Fall 2010**
Introduction to Economic Analysis **Jeffrey Parker**
Problem Set #1 **Due: Wednesday, September 8**

Instructions: This problem set is due in class on Wednesday, September 8. Each student is to hand in his or her own independent solutions to the problem set. You may work together on the problem sets as long as "working together" means learning together or learning from each other and not simply sharing final answers.

If you get stuck, you are encouraged to ask questions of the instructor or the tutors. Tutors will be available at work sessions Monday and Tuesday evenings in the Dorothy Johansen House. Although Jeff's office hours are canceled on Monday (due to holiday) and Tuesday (due to medical appointment), he will be available by email both days. Individual tutoring (at no cost for up to one hour per week) can be arranged through the Office of Student Services.

---

1. ***Production Possibilities Frontiers.*** Suppose that the tiny nation of Agrizona has 50,000 acres of flat land and 80,000 acres of hills. Each acre of flat land can produce 3 tons of parsnips or 2 tons of avocados. Each acre of hills can produce 1 ton of parsnips or 1 ton of avocados.

(a) How many tons of parsnips can be produced if Agrizona specializes in parsnips?

(b) How many tons of avocados can be produced if they specialize in avocados?

(c) If Agrizona devoted all of its flat land to avocados and all of its hills to parsnips, how much of each could it produce? What if it devoted all hills to avocados and all flat land to parsnips?

(d) Based on your answer to (c), if Agrizona is to produce both parsnips and avocados, where should the parsnips be grown and where should they grow avocados? Why?

(e) Draw the production possibilities frontier (PPF) for Agrizona with production of parsnips on the vertical axis and production of avocados on the horizontal axis. Identify the four points discussed in parts (a) through (c). Why is its shape different from the smooth curve in Stiglitz's Figure 2.4? How could we change our simple assumptions to make the PPF a smooth curve?

(f) What is the opportunity cost of avocados (in terms of parsnips) on the upper part of the PPF? On the lower part? Explain the relationship between opportunity cost and the slope of the PPF.

(g) What additional information would we need in order to know the point on the PPF at which Agrizona would (or should) produce?

(h) Show how and explain why Agrizona's PPF would change if it conquered an additional 20,000 acres of hills from a neighboring country.

(i) Show how and explain why Agrizona's PPF would change if a new technology of parsnip cultivation raised the flat-land (only) yield of parsnips to 4 tons per acre. (Assume the original land areas.)

2. ***Analytics of a Linear Demand Curve.*** Suppose that the market demand for asparagus in Astonia is given by $Q_d = 25{,}000 - 2{,}000P$, where Q_d is the quantity demanded in pounds and P is the price of asparagus in dollars per pound.

(a) Graph the demand curve with price on the vertical axis and quantity on the horizontal axis.

(b) What is the slope of the demand curve? Is it constant? Explain the relationship between the slope and the coefficients of the demand equation?

(c) At what values does the demand curve intersect the vertical and horizontal axes? What economic interpretation can be attached to each of these points?

(d) What happens when the price is above the vertical intercept value or if quantity is greater than the horizontal intercept value? Is this realistic?

3. ***Analytics of a Logarithmic Demand Curve.*** Suppose that the market demand for peanut butter in Legumia is given by $\ln Q_d = 1.3863 - \ln P$, where ln is the natural (base e) logarithm function.

(a) Take the anti-logs of both sides of the demand equation to express Q_d directly as a function of P. (You should use a scientific calculator or a Web site such as http://www.1728.com/logrithm.htm (*sic*) if it is helpful.)

(b) Calculate the values of Q_d corresponding to prices of 0.10, 0.50, 1, 5, 10, and 100. Graph these points. What does the demand curve look like? Is it a straight line?

(c) At what values, if any, does the demand curve intercept the vertical and horizontal axes? Is this more or less realistic than the linear demand curve in the previous problem?

4. ***Market Equilibrium, Price Supports, and Subsidies.*** The U.S. Department of Agriculture is interested in analyzing the domestic market for corn. The USDA's staff economists estimate the following linear equations for the demand and supply curves (in the neighborhood of equilibrium):

$$Q_d = 1{,}600 - 125P$$

$$Q_s = 440 + 165P$$

Quantities are measured in millions of bushels; prices are measured in dollars per bushel.

(a) Calculate the price and quantity that will prevail in competitive equilibrium. Graph the curves and show the equilibrium.

(b) Suppose that the government imposes a $4.50 per bushel support price (in other words, it does not allow sales at a price below $4.50) and commits to buying any surplus that might arise at that price.

(i) What impact will this price floor have on the market?

(ii) Will the government be forced to purchase corn in order to support the price floor? If so, how much and what will be the cost to the Treasury?

(iii) How much (if any) additional corn (relative to equilibrium) will be produced as a result of the price support? How much (if any) less corn will be consumed?

(c) Now suppose that a new corn hybrid is developed that increases yields so that the quantity supplied increases by 145 million bushels at each level of the corn price. What is the new equation for the supply curve? How will your answers to parts (a) and (b) be different?

(d) Returning to the original values, suppose that instead of a price floor, the government pays corn growers $0.50 for each bushel produced.

(i) Explain why the supply curve with the subsidy would become $Q_s = 440 + 165(P + 0.50)$.

(ii) Calculate the new market equilibrium quantity and price.

(iii) Graph the new supply curve and show the new equilibrium.

(iv) How does the outcome under the subsidy compare to the outcome under the price support in terms of quantity bought by consumers, quantity produced by farmers, and cost to the government? Are there any other differences in the outcomes?