Homework 1
due Tuesday Feb 14
Economics of the Environment and Natural Resources/Economics of Sustainability
K Foster, CCNY, Spring 2012

You are encouraged to form study groups to work on these problems. However each student must hand in a separate assignment: the group can work together to discuss the papers and comment on drafts, but each study group member must write it up herself/himself. When emailing assignments, please include your name and the assignment number as part of the filename.

Please write the names of your study group members at the beginning of your homework to acknowledge their contributions.

1. Consider a market that can be represented by a linear demand curve, $Q_D = 60 - 4P_D$, (where Q_D is the quantity demanded and P_D is the price that demanders pay) and a linear supply curve that $Q_S = 2P_S$ (where Q_S is the quantity supplied and P_S is the price that suppliers get).
    a. Graph the two functions with P on the vertical axis.
    b. At a price of 14, how many units are demanded and supplied? What would be Consumer and Producer Surplus if this price prevailed? *(Recall that the area of a triangle is half the base times the height.)*
    c. At a price of 8, how many units are demanded and supplied? What would be Consumer and Producer Surplus if this price prevailed?
    d. Set P_D=P_S and Q_D=Q_S and solve the system of equations to find the equilibrium (find the intersection of the lines). Show on the graph.
    e. What are CS & PS now? Show on the graph. Compare Total Surplus for the 3 cases.
    f. Suppose the government sets a tax of $3 per unit. This means that $P_D = P_S + 3$. What is now the quantity demanded & supplied? What are CS & PS now? What is government revenue (which adds to total surplus)? What is DWL (deadweight loss)?
    g. Suppose that production of this good has an external cost of $3.50 per item. What is the DWL of the free market equilibrium? What is the DWL of the tax case?

2. A small country can use its coast for tourism (people are attracted to pristine coastline) or business/industry (which destroys the tourist appeal). It wants to choose what percent of coast should be preserved for tourism and how much should be kept for industry. Assume that the two industries can be modeled as follows. The coast (C) can be used for tourism, T, or business, B, where each is a percentage so $C_T + C_B = 100$. The jobs from businesses (in hundreds) can be modeled as $B = 3\sqrt{C_B}$ and, symmetrically, the number of tourists (in thousands) is $T = \frac{1}{2}\sqrt{C_T}$. From combining

the first two equations we can write $B = 3\sqrt{100 - C_T}$; from the third equation we can write $C_T = 4T^2$.

a. If 100% of the coast is used for tourism, what is the maximum number of tourists? If 100% were used for business, what is the maximum number of jobs?
b. Write the equation giving B as a function of T. Graph it. (You can use Excel to plot points if it's easier.)
c. What is the opportunity cost, of business given up, if the island moves from zero to one tourist unit? (You can use calculus or find the change between values.)
d. What is the opportunity cost, of business jobs given up, for each unit of tourism, if the island moves to 100% tourism? Plot the opportunity cost.
e. Do the same exercise (find opportunity cost and plot), but find opportunity cost in terms of tourists, for integer units of business jobs.
f. What is the best combination? What additional information is needed?

3. Please complete the "Problems for Review" in the textbook: Chapter 2, Questions 3 and 4.