Econ 73-250A-F
Spring 2001
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Problem Set #3

As indicated on the course syllabus, this problem set is due at the beginning of your recitation section on Friday, March 16. There are three questions on the homework worth a total of 100 points. The points assigned to each part of each question are indicated in brackets.

Exercise #1. The population of Pittsford, NY is divided into two types of individuals: "enthusiastic football fans" (EFF) and "less-than-enthusiastic football fans" (LFF). Both types of individuals have preferences over football games, denoted by x_g (assume this is a continuous variable, i.e. it is possible to watch any fraction of a game), and a composite good, denoted by x_c (measured in \$).

These two types of individuals differ in their preferences for football. EFF's preferences over x_g and x_c are given by the following Cobb-Douglas utility function:

$$u_e(x_g, x_c) = x_g^{\frac{1}{2}} x_c^{\frac{1}{2}}.$$

LFF's individual's preferences over x_g and x_c are given by the following Cobb-Douglas utility function:

$$u_l(x_g, x_c) = x_g^{\frac{1}{4}} x_c^{\frac{3}{4}}.$$

Pittsford is inhabited by 100 individuals, equally split into EFF and LFF. Each inhabitant of Pittsford has an yearly income of \$100. Denote the price of a football game in Pittsford by p_g.

(a) [5 pts.] Compute the aggregate demand function for football games by EFF only. [Notice: here you need to aggregate only EFF] On a clearly labelled diagram with the price p_g on the y-axis and the quantity x_g on the x-axis, plot this demand function.

(b) [5 pts.] Compute the aggregate demand function for football games by LFF. [Notice: here you need to aggregate only LFF] On the same diagram of part (a) plot this demand function [Notice: the scale is not important here].

(c) [5 pts.] Compute the aggregate demand function for football games by all Pittsford inhabitants [i.e., EFF and LFF]. On the same diagram of part (a) plot this aggregate demand function [Notice: the scale is not important here].

(d) [10 pts.] Compute the price elasticity of the aggregate demand function in (c).

(e) [10 pts.] Suppose now that EFF have an income of \$50, while LFF have an income of \$150 (so that average income in the city of Pittsford is always \$100). Is aggregate demand for football games different with respect to the case where each citizen has an income of \$100? Provide an economic intuition for what you find.

Exercise #2. Let the market demand curve for gasoline in the US be determined by the equation

$$Q_D = 6000$$

where Q_D denotes millions of gallons of gasoline demanded in a given month. Let the market supply curve for gasoline be determined by the equation

$$Q_S = 4000P$$

where Q_S denotes millions of gallons of gasoline supplied in a given month when the gasoline price is P per gallon.

(a) [10 pts.] Determine the equilibrium price of a gallon of gasoline. How many gallons will be sold in equilibrium?

(b) [10 pts.] Suppose that the US government imposes a tax of $0.15 per gallon of gasoline sold. How many gallons of gasoline will be sold in equilibrium? What is the gasoline price that consumers pay in equilibrium? What is the price that producers get? Explain the economic intuition behind your results.

(c) [10 pts.] Illustrate your answer to part (b) with a supply and demand diagram. In this diagram, indicate clearly which area corresponds to government tax revenue and which area corresponds to the deadweight loss of the tax. In addition, calculate the amount of government tax revenue and the amount of the deadweight loss.

(d) [15 pts.] In Europe, the price that consumers pay for gas is much higher than in the US. The price of a gallon of gasoline in Europe is about 3 times higher than in the US. Suppose that the difference between the price of gasoline in Europe and the US can be completely explained by the difference in gasoline tax rates (i.e., the demand and supply curves are the same). Compute the quantity tax on a gallon of gasoline that explains the fact that the price of a gallon of gasoline in Europe is 3 times higher than in the US [Notice: you found the US price at point (b)].

Exercise #3. [20 pts.] Do Problem 15.0 in the Workouts book. Do not hand in the sheets from the Workouts book; write your answers instead on a separate sheet to be handed in. Be sure to show your work.