Economics 100A **Prof. McFadden**
Fall 2001 **Due the week of 11/26/01**

Problem Set #11

1. Currently, there is an incumbent monopoly in the market. Next year, a potential entrant may enter. The incumbent needs to make a decision on whether or not it should spend \$50 to lobby the government into passing legislation which places a lump-sum tax of \$100 on the potential entrant if it enters. If the potential entrant stays out of the market it makes zero profit and the incumbent firm makes a monopoly profit, $\pi_m>0$, minus expenditures on lobbying if any (\$50 or \$0). If the potential entrant enters the market, it gets duopoly profit, π_d=\$200, minus the tax if any, and the incumbent gets duopoly profit minus the lobbying costs if any.

   A. Show the game in extensive form. What strategies will be played?

   B. Suppose the tax on the potential entrant is \$210 instead of \$100. Repeat part A. How large must π_m be for the monopolist to want to lobby?

2. Consider a market in which two firms produce a homogeneous product. Market demand is given by $Q_d(P)=200-P$. The cost functions for firm A and firm B are $TC_a(q_a)=5q_a$ and $TC_b(q_b)=0.5q_b^2$, respectively.

   A. Find the Cournot equilibrium quantities supplied by each firm. Graph your result using reaction functions. Find the market price, and calculate profits for each firm.

   B. Now suppose that firm A chooses how much to produce before firm B does (i.e. firm A is a Stackelberg leader, B a follower). Calculate quantities, market price and profit for each firm[1].

   C. Now consider the case where total social welfare is maximized. Find market quantity, quantities supplied by each of the two firms, and market price.

   D. Compare firm output, total output and price for parts A through C. Do your values make sense?

3. The only two consumers in an exchange economy, consumer A and consumer B, consume the only two goods, X and Y, in the economy. There are 20 units of X available and 20 units of Y.

   A. If A and B have identical preferences, mutually beneficial trade cannot occur. True or false? Explain.

   B. Assume A's preferences are described by $U_A=X_A^{0.5}Y_A^{0.5}$ and B's preferences are described by $U_B=2X_BY_B$, where X_A, Y_A, X_B, Y_B are the consumption of X and Y by consumers A and B, respectively. Draw an Edgeworth box describing this scenario. Label the lengths of the sides, draw a few indifference curves for each consumer and (roughly) sketch the contract curve.

[1] Apologies for forcing you to get out your calculator.

C. Now derive an equation for the contract curve. (Hint: Compute the MRS for consumer A as a function of X_A and Y_A, and for consumer B as a function of X_B and Y_B. Impose the restriction that total consumption of X should equal the total units of X available, and do the same for Y. Rearrange to get an equation of Y_A as a function of X_A (your result should look pretty simple)).

D. Suppose that consumer A has an initial endowment of 5 units of X and 15 units of Y, and consumer B has the remainder of what's available. Show, using the concept of MRS and the Edgeworth Box, that a trade could benefit both consumers.

E. Assume the consumers can trade as much as they like at the prices of P_X=1 and P_Y=1. If starting out with the same endowments as in part (D), how much will each consumer want to buy/sell of each good? Is the result a competitive equilibrium?

F. Assume the consumers can trade as much as they like at the prices of P_X=2 and P_Y=1. If starting with equal endowments (each individual has 10 units of both good X and good Y), how much will each consumer want to buy/sell of each good? Is this result a competitive equilibrium?

G. Suppose consumer C considers 2 units of X a perfect substitute for 1 unit of Y and consumer D considers 3 units of X a perfect substitute for 1 unit of Y (these ratios hold at all consumption levels). Now, consumers C and D are the only two consumers in an exchange economy. Repeat part (C).