THE UNIVERSITY OF CHICAGO
DEPARTMENT OF ECONOMICS
Elements of Economic Analysis II
Economics 201
FALL 2001
PROBLEM SET 4

This problem set is due at the **beginning** of the TA session on Friday.

Problem 1: The repeated Cournot outcome and trigger strategies.

Consider an industry with 2 firms. Assume that demand is given by the linear form:

$$P(Q) = a - bQ,$$

where Q denotes the aggregate market quantity. Assume that marginal costs are constant and equal for both firms.

a. Solve for the Cournot equilibrium.

b. Solve for the Collusive outcome.

c. Suppose that one firm cheats. while the other continues to play the collusive outcome. What are profits from deviating?

Now assume that the firms play the infinitely repeated Cournot stage game. Assume that both firms have the same discount factor β. Consider the following **trigger strategy:**

Produce one half of the monopoly quantity in the first period. In the t^{th} period produce $\frac{1}{2}$ the monopoly quantity if both firms have produced $\frac{1}{2}$ the monopoly quantity in each of the previous $(t-1)$ periods. Otherwise, revert to the Cournot quantity.

d. What is the present discounted value of cooperating?

e. What is the expression for the present discounted value of deviating today and then receiving Cournot profits for the rest of time?

f. For what value of β will cooperation be sustained?

Problem 2: Cournot and Stackelberg for quadratic costs.

Suppose that there are two firms that have the following convex cost function:

$$C(y) = \frac{1}{2}(c)^2$$

Let market demand be given by:

$$P(Q) = a - bQ,$$

where Q denotes aggregate market quantity.

a. Find the Cournot equilibrium.

b. What are quantities?

c. What are profits?

d. What is market price?

e. How does this compare to the constant cost example we did in class?

f. Find the Stackelberg equilibrium, assuming firm 1 moves first.

g. What are quantities?

h. What are profits?

i. What is market price?

j. Compare the Cournot and Stackelberg outcomes. Be clear and concise and also discuss what happens to aggregate market quantity and price, as well as the relative outcomes of both firms.