PROBLEM SET 10 – Tutorial Week 13 (November 7–10)

Deadline: 11:59 p.m. two days before your tutorial. Please submit a PDF in groups of 2–3 within your tutorial group. On the first page, write your full names (as on the roster) in alphabetical order. Start each question on a new page. Name your PDF "PSet # – LastName LastName LastName," e.g., "PSet 10 – Banerjee Duflo Kremer." Points will be deducted for not adhering to the instructions.

QUESTION 1

Suppose the world market for calcium is perfectly competitive and, as a first approximation, all existing producers and potential entrants are identical. Consider the following information on the price of calcium:

- Between 1990 and 1995, the market price was stable at about $2 per pound.
- In the first three months of 1996, an unexpected exogenous shock occurred, and the market price declined to $1 per pound, where it remained for the rest of 1996.
- Throughout 1997 and 1998, the market price of calcium increased, eventually reaching $2 per pound by the end of 1998.
- Between 1998 and 2002, the market price was stable at about $2 per pound.

Suppose the technology for producing calcium did not change between 1990 and 2002, and the input prices faced by calcium producers remained constant throughout that period.

(a) Is the exogenous shock in 1996 likely to be a change in market demand or a change in market supply? Explain.

(b) Is the calcium industry a constant-cost, increasing-cost, or decreasing-cost industry? Explain.

(c) Explain the pattern of prices that prevailed between 1990 and 2002. Do you think the number of producers of calcium in 2002 is greater than, smaller than, or the same as the number of producers of calcium in 1990?

QUESTION 2

The long-run total cost function for producers of mineral water is $LRTC(Q) = \gamma Q$, where Q is the output of an individual firm expressed as thousands of liters per year. The market demand curve is $D(p) = \alpha - \beta p$.

(a) Find the long-run equilibrium price and quantity in terms of α, β, and γ.

(b) Can you determine the equilibrium number of firms? If so, what is it? If not, why not?

QUESTION 3

Suppose the market for satay is perfectly competitive. All firms are identical, and the long-run total cost of production for each firm is given by:

$$LRTC(Q,g) = \begin{cases} \frac{Q^2}{4} + g, & Q > 0 \\ 0, & Q = 0 \end{cases}$$

where g is the cost of a satay grill — the machine used to cook satay. Each firm requires one and only one satay grill. The market demand curve for satay is $D(p) = \frac{10{,}000}{p}$.

(a) What is the long-run equilibrium price of satay? How many firms will there be in the market for satay in the long-run equilibrium?
Hint: Your answers will be in terms of g.

(b) Suppose the market supply curve for satay grills is $S(g) = \frac{g}{2}$. Since each firm needs only one satay grill, the market demand for satay grills is equal to the number of firms in the market for satay. Find the market demand for satay grills.

Assuming the market for satay reaches the long-run equilibrium, what is the equilibrium price of satay grills? (Recall that g is the price of a satay grill.) Use the equilibrium price of satay grills to determine the long-run equilibrium price of satay.

(c) Suppose the market demand curve for satay increases to $D(p) = \frac{25{,}600}{p}$. The market supply curve for satay grills is still $S(g) = \frac{g}{2}$. Find the number of firms in the market. Find the market demand for satay grills.

Assuming the market for satay reaches the long-run equilibrium, what is the new equilibrium price of satay grills? (Recall that g is the price of a satay grill.) Use the new equilibrium price of satay grills to determine the long-run equilibrium price of satay.

(d) Based on your answers to (b) and (c), is the market for satay an increasing-cost, constant-cost, or decreasing-cost industry?

QUESTION 4

Suppose the market for catfish in the U.S. is perfectly competitive. All existing producers and potential entrants are identical. Below is a summary of the evolution of the price and quantity in the catfish industry between 2000 and 2008:

- Between 2000 and 2002, the industry was in a long-run equilibrium.
  - Market price: $3 per pound
  - Total quantity demanded and total quantity supplied: 100,000 pounds
  - Each firm supplies: 1,000 pounds
  - Number of firms: 100
- In 2003, an unexpected exogenous shock occurred that affected prices and quantities in the market. Four months after the shock, the market arrived at a short-run equilibrium.
  - Market price: $4 per pound
  - Total quantity demanded and total quantity supplied: 120,000 pounds
  - Each firm supplies: 1,200 pounds
  - Number of firms: 100
- In 2008, the market arrived at a new long-run equilibrium.
  - Market price: $2.50 per pound
  - Total quantity demanded and total quantity supplied: 165,000 pounds
  - Each firm supplies: 1,100 pounds
  - Number of firms: 150

(a) Is the shock in 2003 more likely to be a change in the market demand for catfish or a change in the market supply for catfish? Is the shock more likely to be a positive shock or a negative shock? Explain.

(b) Is the catfish industry a constant-cost, increasing-cost, or decreasing-cost industry? Explain.