Economics 308: Intermediate Microeconomics

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Problem Set #5

1. Suppose the demand for Frisbees is given by

$$Q = 100 - 2P$$

and the supply by

$$Q = 20 + 6P$$

   a. What will be the equilibrium price and quantities for Frisbees?
   b. How would your answers to part (a) change if the supply curve were instead

$$Q = 70 + P$$

   What do you conclude by comparing these two cases?

2. Suppose that the demand for broccoli is given by

$$Q = 1{,}000 - 5P$$

Where Q is quantity per year measured in hundreds of bushels and P is price in dollars per hundred bushels. The long-run supply curve for broccoli is given by

$$Q = 4P - 80$$

   a. Show that the equilibrium quantity here is Q = 400. At this output, what is the equilibrium price? How much in total is spent on broccoli? What is consumer surplus at this equilibrium? What is producer surplus at this equilibrium?
   b. How much in total consumer and producer surplus would be lost if Q = 300 instead of Q = 400?
   c. Show how the allocation between suppliers and demanders of the loss of total consumer and producer surplus described in part (b) depends on the price at which broccoli is sold. How would the loss be shared if P = 140? How about if P = 95?
   d. What would be the total loss of consumer and producer surplus if Q = 450 rather than Q = 400? Show that the size of this total loss also is independent of the price at which the broccoli is sold.
   e. Suppose the demand for broccoli shifted outward to

$$Q = 1{,}270 - 5P$$

   What would be the new equilibrium price and quantity in this market?
   f. What would be the new levels of consumer and producer surplus in this market?
   g. Suppose the government had prevented the price of broccoli from rising from its equilibrium of before. Describe how the consumer and producer surplus measures would be reallocated or lost entirely.

3. A perfectly competitive market has 1,000 firms. In the very short run, each of the

firms has a fixed supply of 100 units. The market demand is given by

$$Q = 160{,}000 - 10{,}000P$$

a. What is the market supply curve in the very short run?
b. Calculate the equilibrium price in the very short run.
c. Calculate the demand schedule facing any one firm in the industry. Do this by calculating what the equilibrium price would be if one of the sellers decided to sell nothing or if one seller decided to sell 200 units. What do you conclude about the effect of any one firm on market price?

4. The handmade snuffbox industry is composed of 100 identical firms, each having short run total costs given by

$$SRTC = 0.5q^2 + 10q + 5$$

and short run marginal costs by

$$SRMC = q + 10$$

where q is the output of snuffboxes per day.

a. What is the short-run supply curve for each snuffbox maker? What is the short-run supply curve for the market as a whole?
b. Suppose the demand for total snuffbox production is given by $q = 1{,}100 - 50P$. What is the equilibrium in this marketplace? What is each firm's total short-run profit?
c. Graph the market equilibrium and compare total producer surplus in this case.
d. Show that the total producer surplus you calculated in part c is equal to total industry profits plus industry short-run fixed costs.
e. Suppose that the government imposes a $3 tax on snuffboxes. How would this tax change the market equilibrium? How would the burden of this tax be shared between snuffbox buyers and sellers? Calculate the total loss of producer surplus as a result of the taxation of snuffboxes. Show that this loss equals the change in total short-run profits in the snuffbox industry. Why don't fixed costs enter into this computation of the change in short run producer surplus?

5. Suppose the production possibility frontier for cheeseburgers (C) and milk shakes (M) is given by

$$C + 2M = 600$$

a. Graph this function.
b. Assuming that people prefer to eat two cheeseburgers with every milkshake, how much of each product will be produced? Indicate this point on your graph.
c. Given that this fast-food company is operating efficiently, what price ratio must prevail?