Example problems
3/1/11 lecture

1. A music publisher pays \$10 to prepare a plate for printing music. After the plate is prepared, the publisher can make as many copies of the music as he wants for \$1 per copy.

a. Give equations for average cost, average variable cost, and marginal cost.

b. Graph average cost, average variable cost, and marginal cost.

2. Consider a city that has a large number of hot dog stands operating throughout the downtown area. Suppose that each vendor has marginal cost function $MC = .1q$, and has variable costs of $.05q^2$. In addition, each stand must pay a licensing fee to the city of \$F/day. A stand must renew its license once/year, so it is a sunk cost once paid.

a. Suppose that $F = \$125$. Suppose that the current price of a hot dog is \$4. What is the maximum profit each firm can earn?

b. Will the long-run price be higher, lower, or the same as in part a.? Explain the economic intuition behind your answer.

c. Suppose that the city wants to increase revenue gained from hot dog licensing fees. Should they increase or decrease F? If it depends, say on what it depends.

3. Suppose the market for lawn care in Lexington is perfectively competitive, with each firm having a cost function equal to $c(Q) = 32 + Q + \frac{1}{2}Q^2$, where Q is the number of man hours spent working on lawns (so that marginal cost is $c'(Q) = 1 + Q$). The demand for lawn care services is given by $P = 49 - \frac{1}{3}Q$.

a. Solve for the long-run equilibrium price and quantity.

b. How many firms are in the market in the long run?

4. Consider a perfectly competitive firm selling Christmas trees. Its total cost function is estimated as $TC = 6,860 + \left(T + t + \frac{7}{12}\right)q + \frac{37}{27,000,000}q^3$. Here, T is the wholesale cost of a tree and t is transport cost. Consequently, its marginal cost is given by $MC = \left(T + t + \frac{7}{12}\right) + \frac{37}{9,000,000}q^2$.

a. Suppose that $T = 11.5$ and $t = 2$. Find the shutdown price.

b. Suppose that $T = 11.5$ and $t = 2$. Find the zero-profit price.

c. Find the seller's supply function, with price as a function of q, t, and T.

d. What happens to the seller's supply price as t increases? Explain in words what your answer represents.

5. The market for lobsters is perfectly competitive. Total cost for a firm that harvests q lobsters is $TC = 800 + .5q^2$. The market demand curve for lobsters is $Q = 2,000 - 5P$.

a. Solve for the market's long-run equilibrium. Find output by each firm (q), market price (P), and the number of firms in the market.

b. Now suppose that the government imposes a \$450 tax on each firm, raising costs to $TC = 1,250 + .5q^2$. In the short-run, where the number of firms is the same as in part a., find the output by each firm q and the market price p.

c. Calculate the profit or loss earned by each firm. Will there be entry or exit?

d. Find the new long-run equilibrium output by each firm (q), market price (P), and the number of firms in the market after the imposition of the tax.

e. Who bears the burden of the tax in the short-run? Who ultimately pays the tax in the long-run?