Costs

1. In a small town, there is a mousepad factory which employs workers at $8 an hour, for forty-hour weeks. There is an old composer in town, who expects to complete an opera in a year's time. On the other hand, if he were not composing, he could give harp lessons, and charge his students $15 an hour. What is his opportunity cost in writing his opera? Explain the assumptions you made in deriving this answer.

2. A firm can choose between two production technologies for a new product line. If it installs technology 1, its yearly costs will be $C_1(q) = 3600 + 65q + 36q^2$. If it installs technology 2, they will be $C_2(q) = 900 + 900q + q^2$.

- What is the firm's long-run average cost curve?

- What is the firm's minimum efficient scale of production?

- Which technology would the firm prefer (purely from a cost standpoint) if it expected to sell 30 units in summer and 10 units in winter each year?

- What if it were more optimistic about summer sales? Explain.

3. A firm produces both pencils and erasers in a ratio of 2:3. Its costs are $C(q_1, q_2) = 3200 + 0.1q_1 + 2q_1^2 + 0.2q_2$, where q_1 is the output of pencils and q_2 the output of erasers.

- Derive its ray average cost function

- Derive its minimum efficient scale (MES) of production

- What is the MES if it produces only pencils?

- What is the MES if it produces only erasers?

Perfect competition

4. Suppose a competitive market consists of identical firms with a constant long-run marginal cost of $10. (There are no fixed costs in the long run). Suppose the demand curve is given by $q = 1000 - p$.

(a) What are the price and quantity consumed in the long-run competitive equilibrium?

(b) Suppose one new firm enters that is different from the existing firms. The new firm has a constant marginal cost of $9 and no fixed costs but can only produce 10 units (or fewer). What

are the price and the quantity consumed in long-run competitive equilibrium? Are these the same as in (a)? Explain.

(c) Are positive economic profits inconsistent with a long-run competitive equilibrium?

(e) In the long-run competitive equilibrium, must the profit of the marginal entrant be zero?

5. Suppose a firm's costs are $C(q) = 100 + 10q - 6q^2 + 3q^3$. If all fixed costs are sunk, at what price will it shut down? If a percentage α of the fixed costs are sunk, at what price will it shut down?

Monopoly

6. If the demand curve is $q = 5/p$, what is the elasticity of demand? What is total revenue when $p = 1$ and when $p = 30$? If production costs $1 per unit, and the smallest production level is 1 unit, how much should the monopolist produce?

7. A market with demand $q = 16/p^2$ is supplied by a monopoly with costs $C(q) = 6 + q^2/8$. Calculate the equilibrium price, output, and monopoly profits.

Derive the minimum efficient scale of production in this market. Can a competitive equilibrium exist with firms producing at this scale?

Open-ended questions

8. It is sometimes observed that many small businesses follow a rule of thumb such that when costs change, they adjust their prices so that the profit margin $(p - c)$ stays the same. Does this make sense?

9. Consider a market dominated by a large retailer which sells thousands of products. You measure the price elasticity of demand for those products, and discover that over 30% of the products have values of demand elasticity which are less than 1 in absolute value. Does this make sense?

Paper topic

10. Start thinking about the topic for your class paper. What industry are you interested in studying? Who are the big players, the main products? How would you characterize the market structure (competitive, monopoly). What are the pricing schemes?