Homework Set 7

1. (10%) At the monopoly price the price elasticity of demand is -2 and the ratio of price to the firm's average cost is 1.3. Can you tell from this information whether the firm is operating in the region where there are economies of diseconomies of scale?

2. (10%) Before a monopolist introduces a new process innovation, it produces Q_o. Units. After a new process innovation is introduced the monopolist increases output to Q_1 and lowers the price. The monopolist produces Q_1-Q_0 units in new plants that use the new technology since the average variable cost of the old plant is less than the long run average cost of a new plant? Is the monopolist maximizing profits? With the use of graphs explain why or why not.

3. (10%) Suppose the price a monopolist can charge is regulated by the government. Find the regulated price that maximizes the total number of units sold. Hint. At the regulated price, the firm's marginal revenue equals price up to the quantity demanded on the demand function.
    - Assume the government sets the price ceiling so that the regulated monopolist sells the maximum quantity. Then a regulator allows competitive bidding for the right to be a monopolist.
    - With the aid of graphs, determine how much a firm will pay for the right to be a monopolist under these circumstances.
    - Does the amount the regulated monopolist pays tell you whether long run average cost is increasing or decreasing?

4. (10%) A monopolist produced 1 million units last year. If a $10 per unit tax is imposed, the profits of the monopolist will decrease by $10 million. Explain why you agree or disagree with this statement.

5. (10%) A monopolist has a demand curve

$$Q = 200 - 5P$$

He has one – and only one- plant. Its cost function is given by the following table:

Q	C
0	$ -
1	$ 22
2	$ 28
3	$ 31
4	$ 33
5	$ 37
6	$ 42
7	$ 48
8	$ 55
9	$ 63
10	$ 72
11	$ 84
12	$ 98
13	$ 113
14	$ 130
15	$ 149
16	$ 170
17	$ 193
18	$ 218
19	$ 245
20	$ 274
21	$ 305
22	$ 339
23	$ 378

- How many units of the product should he make? What should he charge for the product?

6. (10%) A monopolist with a price elasticity of -10 will have a smaller price-marginal cost margin and lower total profits than a monopolist with a price elasticity of -3. Explain why you agree or disagree with this statement.

7. (10%) If the government levies a per unit tax on a monopolist, the monopolist increases price and reduces the total quantity sold. Total revenue may either increase or decrease. Explain why you agree or disagree with this statement.

8. (10%) A monopoly has a demand function

$$Q = 1000 - 20 P.$$

It has the capability to build plants with a cost function given by the following table:

Quantity	Cost
0	10
1	12
2	14

3	17
4	20
5	25
6	32
7	41

What will it sell the product for? How many plants will it operate? How many units will it sell?

9. (10%) For each of the following questions, tell me whether it is true or false and explain why.

- Unlike competitors monopolists have the option of earning higher profits by raising their prices.

- If the supply of land is fixed, then it can be equally efficient for land to be supplied by a monopolist or by competitors.

- Fuzzy dice are produced only by Americans and consumed only by non-Americans. An excise tax on fuzzy dice can improve the welfare of Americans (explain with a graph).

10. (10%) The demand curve for a particular product is given by
$$Q = 240 - 10 P$$

Initially there are ten plants producing widgets. Each plant belongs to a different firm. (Indeed, there is a law restricting each firm to one plant). Nine of the ten plants have a cost function
$$16 + q^2$$
The tenth plant (Acme) has an exemption from environmental laws so that its cost function is

$$9 + q^2$$

a) Assuming initially that only these ten firm/plants may produce widgets, determine the equilibrium price and quantity of widgets, as well as the profits of each firm, including Acme.
b) Now assume that other firms may open a (single) plant and produce widgets if they wish. If they do, their cost function will be the same as the nine plants. Determine the equilibrium price of widgets, the number of firms in the industry, the quantity of widgets produced by each firm, and the profits of each firm, including Acme.

c) Now suppose that Acme Widgets, the owner of the first plant, is given a legal monopoly to produce widgets, but is also given the right to open as many other plants as it wishes. Determine how many plants Acme will operate, the number of widgets it will produce at each plant, the price it will charge for widgets, and its profits. (Acme's environmental exemption and hence its cost break applies to only one plant)