Homework Set 6

1. (20%) Three firms are now manufacturing widgets for sale in a highly competitive market. Their cost functions are as follows:

Quantity Produced	Total Costs for Firm A	Firm B	Firm C
1	1	1	1
2	3	4	2
3	6	8	4
4	10	13	7
5	15	19	11
6	21	26	16
7	28	34	21
8 and above	28 + 12 per unit	34+ 13.5 per unit	21+ 10.5 per unit

- Show how many widgets each firm will produce at the following prices:

Price	Production by			
	Firm A	Firm B	Firm C	Total
$1				
$2				
$3				
$4				
$5				
$6				
$7				
$8				
$9				

The demand function for widgets equals:

$$26-2p$$

At what price do widgets sell? *Explain and defend your answer.*

How many are produced? By which firms? Explain and defend your answer

2. (10%) Since a monopolist equates marginal revenue to marginal cost, an upward shift in the marginal cost function will increase a monopolist's marginal revenue and marginal cost by the same amount so total profits will not be affected. Explain why you agree or disagree with this statement.

3. (10%) The size of fixed cost will not affect the quantity produced by the monopolist in the short run. Explain why you agree or disagree with this statement.

4. (10%) A monopolist has a demand function and a cost function given by the following table. How many should he produce? And what price should he sell it? And what will be his profits?

Q	P	C
0		6
1	15	11
2	13	16
3	11	21
4	8	26
5	7	31
6	6	36
7	5	41

5. (15%) The demand curve for a particular product is given by

$$Q = 420 - 10\,P$$

There is one and only one way of producing widgets. The cost varies with the number produced at each plant.

Q	C
0	0
1	22
2	28
3	36
4	52
5	70

Assume initially that, by law, a firm is limited to operating one and only one plant.

a) What level of output minimizes average cost? Explain your answer.
b) Assuming that the industry is competitive, what will be the price of widgets?
c) How many will be sold?
d) How many plants/firms will produce widgets?
e) Now assume that a firm is allowed a monopoly in the production of widgets. What price will it charge?

6. (15%) The market for a certain product is highly competitive. Right now there are numerous firms producing the product. The current technology is about 20 years old. Everyone in the industry uses it. A new technology is about to come along, which will reduce the cost of making the product to $10 each. Your firm, Wonder Technologies, Inc. has asked you to evaluate the market for this new product. Initially the job of evaluating the project fell to the management consulting firm, Dull, Dull, and Overpriced (DDP). At great expense, they had determined the cost structure for existing plants to be as follows:

Quantity	Total Cost
0	11
1	14
2	26
3	36
4	52
5	75

They had also determined that currently, 15,000 units of this product were sold annually. The price is expected to drop when the new technology comes on the market. DDP estimated that each $1 drop in price would increase annual demand by 2,000 units.

Management has asked you to answer several questions

(a) What will be the total market for this product when the new innovation comes on the market?

(b) What will be the price of the product when the new innovation comes on the market?

(c) Assuming that no firms currently producing the product leave the market, what will be the number of units produced using the new technology?

(d) Over time, the plants using the current technology will wear out and leave the industry. When 3,000 plants remain, what will be the annual production using the new technology? (You may assume that no, even, newer technology, comes to market).

Note: in answering these questions, you might think it useful to know how many plants there are now, and what the current price of the product is. All that information was contained in the DDP interim report, but the only parts of that report available to you are the data given above. And, to make life more interesting, your supervisor is too cheap to authorize you to do any market research. Fortunately, you need not do any.

7. (20%) Three firms are now manufacturing widgets for sale in a highly competitive market. Their cost functions are as follows:

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1	1	1	1
2	3	4	2
3	6	8	4
4	10	13	7
5	15	19	11
6	21	26	16
7	28	34	21
8 and above	28 + 12 per unit	34+ 13.5 per unit	21+ 10.5 per unit

The demand function for widgets equals:

$$65-10p$$

- What is the price at which widgets sell?
- How many are produced? By which firms?

After some complicated maneuvering in the stock market, including an LBO, a tender offer, and a divestiture, the three firms are acquired by the same individual.

- Does the price at which widgets are sold change? And if so, to what?
- How many widgets does each firm (plant) now make?

Explain your answers.