Homework 2

Problem 1

a) What are the characteristics of a perfectly competitive industry?

Answer: In a perfectly competitive industry there are many buyers and sellers and there are relatively low barriers to entry and exit from the industry. Firms are price takers since they are such a small portion of the total market and produce homogeneous products.

b) Why do economists use game theory to study the actions of firms in oligopoly markets but not in other markets we have studied?

Answer: In oligopoly markets, there are a few firms whose actions are interdependent. Hence, oligopolists have strategies that economics can model using game theory. Only one firm exists in a monopoly, so there are no interdependent actions of firms. In perfect competition and monopolistic competition, there are so many firms that each firm is too small for its actions to affect other firms in the market

c) Suppose that two cereal producers are playing a "price war" game. They can either charge a high or low price. The matrix below shows the possible profits in case of particular strategy. Does any firm have a dominant strategy in this game? Find the Nash equilibrium of the game and argue whether it represents the best possible outcome according to the matrix.

		Kellogg's	
		Price High	**Price Low**
General Mills	**Price High**	GM: $50 mil K: $60 mil	GM: $10 mil K: $110 mil
	Price Low	GM: $100 mil K: $20 mil	GM: $25 mil K: $30 mil

Answer: Low price is a dominant strategy for both, therefore, the Nash equilibrium is both charge low price with 25 million and 30 million profits by Kellogg and GM, respectively. It is not the best possible outcome according to the matrix since total profits are higher when one of them charges low and another high price. Also note that this is not a symmetric matrix, players do not have symmetric payoffs

Problem 2

The following table shows the total output produced by the top six firms as well as the total industry output for each industry.

Firm	Industry J	Industry K	Industry L	Industry M
1	14,288	7,878	1,554	22,987
2	12,128	7,242	1,486	21,444
3	11,192	5,321	1,294	18,787
4	3,245	4,900	1,287	16,454
5	2,442	4,526	911	12,890
6	1,004	3,800	745	10,045
Total	*55,050*	*70,250*	*7,340*	*198,400*

i)   What is the concentration ratio for Industry J? **about 74%**
ii) Which industry is the least competitive? **Industry L**
iii) Which industry has the lowest concentration ratio? **Industry K**

Problem 3

The figure is drawn for a monopolistically competitive firm
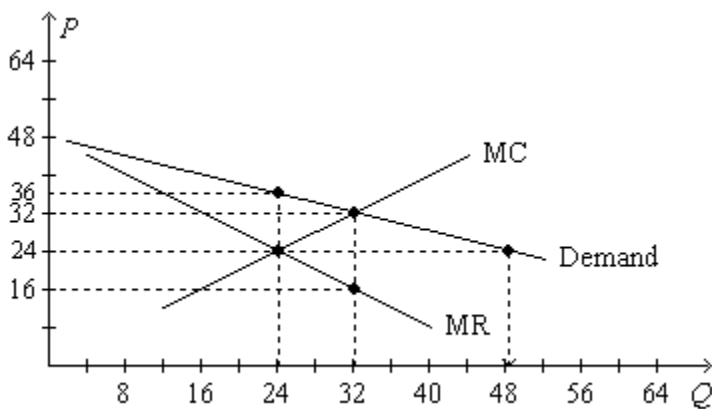
i)   What is the firm's profit maximizing level of output? **24 units**

ii) In order to maximize profit, what price the firm will charge? **36$**

iii) Suppose that average total cost is $36 when Q=24. What is the profit-maximizing price and resulting profit? **P=$36, profit=$0**

iv) If the average variable cost is $24 at the profit maximizing quantity, and if the firm's fixed costs amount to $60, then what is the firm's maximum profit? **228$**

v) If the average variable cost is $26 at the profit maximizing quantity, and if the firm's profit is $40 at that quantity, then what its fixed costs amount to? **200$**

vi) Suppose you were to add the ATC curve to the diagram to show the firm in a situation of long-run equilibrium. You would draw the ATC curve
   a. with its minimum at the point (Q = 24, P = $36).
   b. with its minimum at the point (Q = 24, P = $24).
   c. **tangent to the demand curve at the point (Q = 24, P = $36).**
   d. tangent to the demand curve at the point (Q = 32, P = $32).

vii) If the ATC=40 at the profit-maximizing level of output, which of the following will occur in the long run in this industry?
   a. **Firms will exit this industry.**
   b. Firms will enter this industry.
   c. This firm will continue to earn positive economic profits.
   d. This firm will incur losses.

Problem 4

For a monopolist, when the price effect is greater than the output effect, marginal revenue is
a. positive.
b. negative.
c. zero.
d. maximized.

Problem 5

A profit-maximizing monopolist charges a price of $12. The intersection of the marginal revenue and marginal cost curves occurs where output is 10 units and marginal cost is $6. Average total cost for 10 units of output is $5. What is the monopolist's profit?
a. $60
b. $70
c. $100
d. $120

Problem 6. (**1 hour**) Imagine that in Brno two residents, Lucia and Silvia own wells that produce safe drinking water. Each week Lucia and Silvia work together to decide how many gallons of water to pump. They bring the water to town and sell it at whatever price the market will bear. To keep things simple, suppose that Lucia and Silvia can pump as much water as they want without cost so that the marginal cost of water equals zero. The weekly town demand schedule and total revenue schedule for water is shown in the table below:

Weekly Quantity (in gallons)	Price	Weekly Total Revenue (and Total Profit)	Marginal Revenue
0	$12	$ 0	
25	11	275	
50	10	500	
75	9	675	
100	8	800	
125	7	875	
150	6	900	
175	5	875	
200	4	800	
225	3	675	
250	2	500	
275	1	275	
300	0	0	

a) (**2pt**) Calculate marginal revenue for this demand schedule.

Weekly Quantity (in gallons)	Marginal Revenue
0	NA
25	$11
50	$9
75	$7

100	$5
125	$3
150	$1
175	($1)
200	($3)
225	($5)
250	($7)
275	($9)
300	($11)

b) (**2pt**) If Lucia and Silvia operate as a profit-maximizing monopoly in the market for water, what price will they charge and how many gallons of water will they produce? **6 dollars, 150 gallons.**

c) (**2pt**) If Lucia and Silvia operate as a profit-maximizing monopoly in the market for water, how much profit will _each_ of them earn? **75*6=450$**

d) (**2pt**) If the market for water were perfectly competitive instead of monopolistic, how many gallons of water would be produced and sold? **300 gallons**

e) (**2pt**) Draw a graph showing market demand curve, marginal revenue and marginal cost curves, monopolistic profit and the dead weight loss. You do not have to be precise.

f) (**2pt**) Calculate the dead weight loss of the monopolistic allocation in which Lucia and Silvia form a cartel. **DWL=(300-150)*6/2=450$**

g) (**4pt**) Draw the payoff matrix of this game considering that the monopolistic allocation may not be a Nash equilibrium.

Silvia

		75	100
Lucia	75	450 / 450	500 / 375
	100	375 / 500	400 / 400

h) (**3pt**) What will be the price and the _market_ quantity of water once Lucia and Silvia reach a Nash equilibrium? **200 gallons at 4 dollars.**

i) Under what circumstances is it possible to achieve more favorable cartel allocation? **If the game is repeated multiple times – tit for tat**