Econ 101
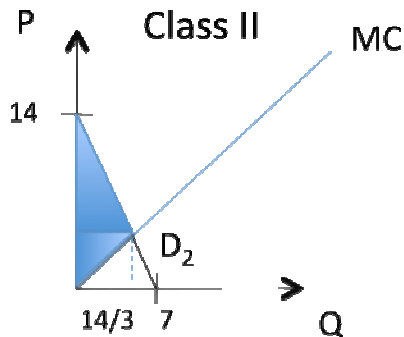**Fall 2008**
Homework #5 Solutions

Problem One: Price Discrimination

a.
(1) $4 because P = 14 – 2*5 = 4.
(2)

(3) 14-2Q = Q => Q=14/3. PS = 14*(14/3)*(1/2) = $98/3.
(4) CS = 0.
(5) It is allocatively efficient because the price for the last unit purchased ($14/3) is equal to the marginal cost of the last unit produced.

b.
(1) When 10 < P ≤ 14, Q = 7 – P/2; when 0 ≤ P ≤ 10, Q = 27 – 2.5P.
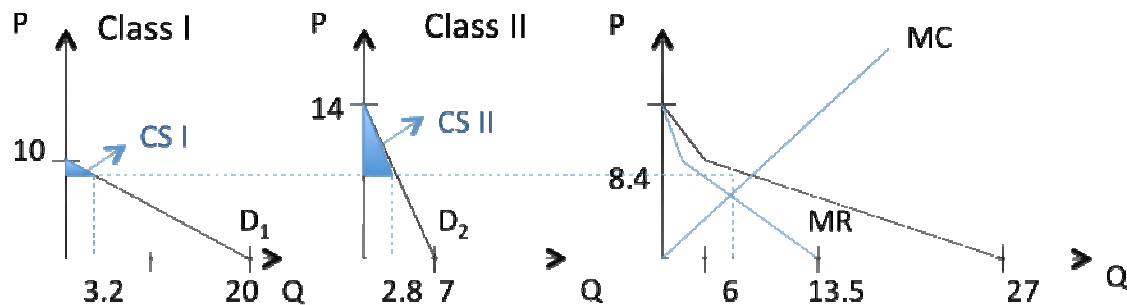(2) Rearrange the market demand curve to the slope-intercept form: when the 10 < P ≤ 14, P = 14 – 2Q; when 0 ≤ P ≤ 10, P = 10.8 – 0.4Q. So the marginal revenue curve is when 10 < P ≤ 14, MR = 14 – 4Q; when 0 ≤ P ≤ 10, MR = 10.8 – 0.8Q.
(3) The monopolist chooses the quantity by MR(Q) = MC(Q): 10.8 – 0.8Q = Q. So Q_M = 6. By the market demand curve, P_M = 10.8 – 0.4*6 = $8.4 per unit.
The consumer of Class I will purchase Q_1 when the price is P_M = 8.4. By the demand curve of Class I, Q_1 = 3.2. CS I = (10-8.4)*3.2/2 = $2.56.
The consumer of Class I will purchase Q_2 when the price is P_M = 8.4. By the demand curve of Class II, Q_2 = 2.8. CS II = (14-8.4)*2.8/2 = $7.84. Note that Q_1 + Q_2 = 3.2 + 2.8 = 6 = Q_M.
The monopolist's profit = TR – TC = $P_M Q_M$ – $0.5Q_M^2$ = 8.4*6 – 0.5*6² = $32.4.

P ⋀ Class I   P ⋀ Class II   P ⋀   MC

CS I   14 ⎯ CS II

10 ⎯   8.4 ⎯

D₁   D₂   MR

3.2   20 Q   2.8 7   Q   6   13.5   27   Q

c.
(1) $MR_1(Q) = 10 - Q$
(2) $MR_2(Q) = 14 - 4Q$
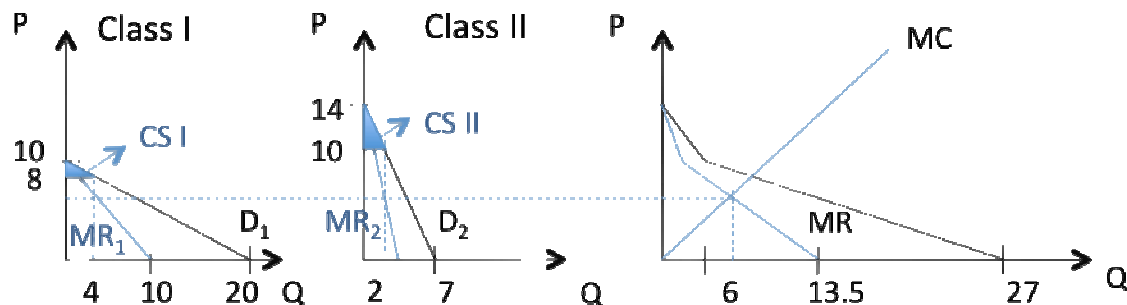(3) $MR_1(Q_1) = MC(Q_1 + Q_2)$: $10 - Q_1 = Q_1 + Q_2$ => $10 = 2Q_1 + Q_2$
    $MR_1(Q_1) = MC(Q_1 + Q_2)$: $14 - 4Q_2 = Q_1 + Q_2$ => $14 = Q_1 + 5Q_2$
So $Q_1 = 4$, $Q_2 = 2$.
By demand curve of Class I, $P_1 = 10 - 4/2 = \underline{\$8 \text{ per unit}}$. By demand curve of Class
II, $P_2 = 14 - 2*2 = \underline{\$10 \text{ per unit}}$.
CS I = $(10-8)*4/2 = \underline{\$4}$. CS II = $(14-10)*2/2 = \underline{\$4}$.
The monopolist's profit is $TR_1 + TR_2 - TC = 8*4 + 10*2 - 0.5*(4+2)^2 = 32 + 20 - 0.5*36 = 52 - 18 = \underline{\$34}$.

P ⋀ Class I   P ⋀ Class II   P ⋀   MC

CS I   14 ⎯ CS II
10 ⎯   10 ⎯
8 ⎯

MR₁   D₁   MR₂   D₂   MR

4   10   20 Q   2   7   Q   6   13.5   27   Q

(4) Compare the results in the tables in b. and c by completing the following
sentences. The monopolist gains _higher_ profit by 3rd degree price discrimination.
The buyers of Class I whose demand curve is more _elastic_ have _higher_ consumer
surplus by 3rd degree price discrimination. The buyers of Class II whose demand
curve is more _inelastic_ have _lower_ consumer surplus by 3rd degree price
discrimination.

Problem Two: Factor Markets

(1) For perfect competition, $MR = P = 10$.

(2) Find the interception of the supply and demand curves of the labor: $P_L = 60 - P_L$.
So $P_L = 30$ and $Q_L = 30$.

(3)

L	K	Q	MP$_L$	TR	MRP	VC	FC	TC	MFC	profit
0	1	0	---	0	---	0	80	80	---	-80
1	1	1	1	10	10	30	80	110	30	-100
2	1	5	4	50	40	60	80	140	30	-90
3	1	15	10	150	100	90	80	170	30	-20
4	1	20	5	200	50	120	80	200	30	0
5	1	23	3	230	30	150	80	230	30	0
6	1	24	1	240	10	180	80	260	30	-20

(4) When L=5, MRP = MFC for a representative firm. The profit for the firm is maximized at L=5. So one firm will hire 5 units of labor.

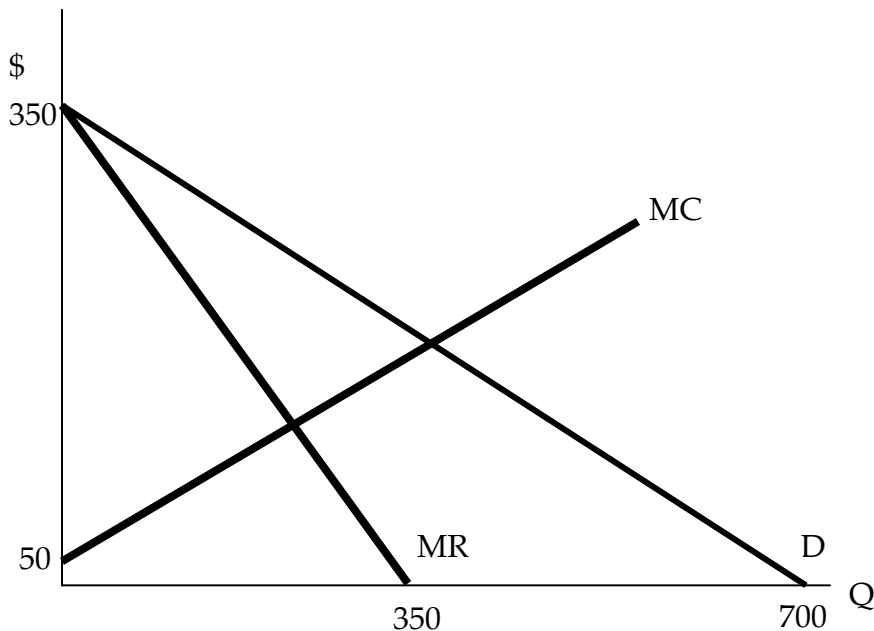(5) $60-P_L = 40+P_L$. $P_L = 10$. So now MFC = P_L = 10. By the table, we know that at L=6, MRP = 10. Therefore, one firm will hire 6 units of labor to maximize its profit.

Problem Three: Monopolistic Competition

a. Derive the marginal revenue curve for this firm.

MR = 350 – Q

b. Draw the demand, MR and MC curves for this firm in one graph.

c. What is the optimal quantity for this firm to produce if the firm's goal is to profit maximize?

Optimal quantity = 200

d. Calculate the profit for this firm.

We need to find TR and TC.
To find TR we need the price the firm will charge.
**Plug Q = 200 into the firm's demand curve to find P = $250.**
TR is thus: $250 × 200 = $50,000.
To find TC plug Q = 200 into the TC function. Find: TC = $20,010.
Profit is thus: $50,000 – $20,010 = $29,990.

e. Predict what is going to happen in the long run to this firm and illustrate this long run outcome in a graph.

Since the firm is making a positive profit other firms will enter the industry. The demand faced by this firm will shift to the left until the profit goes down to zero. The ATC curve will meet the demand curve tangentially at the quantity where the new MR=MC.
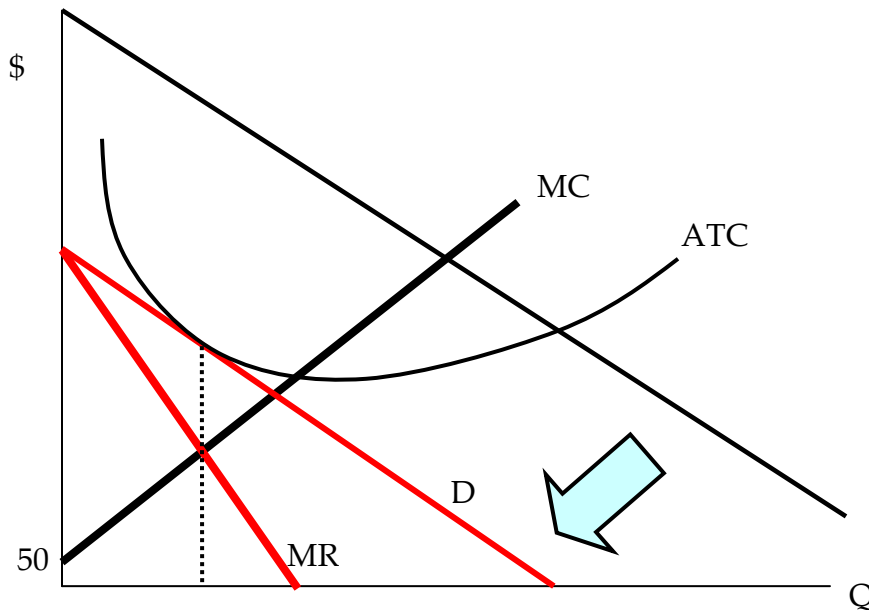
Problem Four: Game Theory

a. Find the dominant strategy for each agent (if one exists).
Sly: no dominant strategy
Sneaky: Infiltration

b. Find the dominant strategy for each agent (if one exists)
Sly: Poison dart
Sneaky: no dominant strategy

c. Find the dominant strategy for each agent. Which agent ends up with the highest payoff?
Sly: Intimidation
Sneaky: Hide
Both agents end up with the same payoff: 10.

Problem Five: Game Theory

a. Set up the payoff matrix for this game.

		Kislouski / C.I.A.	
		Listen	Take a bathroom break
Bourne	Order pizza	-10,10	10,-10
	Don't order pizza	0,0	0,10

b. Is Bourne better off ordering a pizza regardless of Kislouski's strategy choice?

No. If Kislouski continues to listen Bourne is better off not ordering.

c. Does Bourne have a dominant strategy?

Bourne's best strategy depends on the strategy that Kislouski chooses. Therefore Bourne doesn't have a dominant strategy.

d. Now suppose Bourne is watching Kislouski from his hiding place across the street from C.I.A. headquarters. Now Bourne can make is strategy choice contingent on Kislouski's strategy choice. How will Bourne respond to either of Kislouski's strategy options and what will the resultant payoff to Bourne and Kislouski be in each case?

Case 1: Kislouski takes a bathroom break.
Bourne will order pizza and get 10 utils points. Kislouski gets –10.

Case 2: Kislouski stays at his post and listens.
Bourne will not order pizza, gets 0 utils. Kislouski also gets 0.