EC3322
Industrial Organization I
Semester 1, 2012-2013
Midterm Solutions
October 4, 2012

1. *True.* In the long-run competitive equilibrium, firms earn zero profit. Profit maximization implies $p = MC$, and the zero profit condition says that $p = AC$. Therefore, $MC = AC$.

2. *False.* As part of third-degree price discrimination, the monopolist is free to set the same price in each market. Therefore, he can always earn at least as much profit as under uniform pricing.

3. The marginal revenue of firm 1 is

$$MR_1 = 30 - 2q_1 - q_2.$$

   Set MR_1 equal to $MC = 0$ and impose symmetry ($q_1 = q_2$) to find the Nash-equilibrium $q_1^* = 10$ and $q_2^* = 10$. Price is $p^* = 10$ and profit per firm is $\pi^* = 100$.

4. (a) The first action of each strategy of player 2 is the action taken if player 1 plays D. The second action is player 2's action if player 1 plays U.

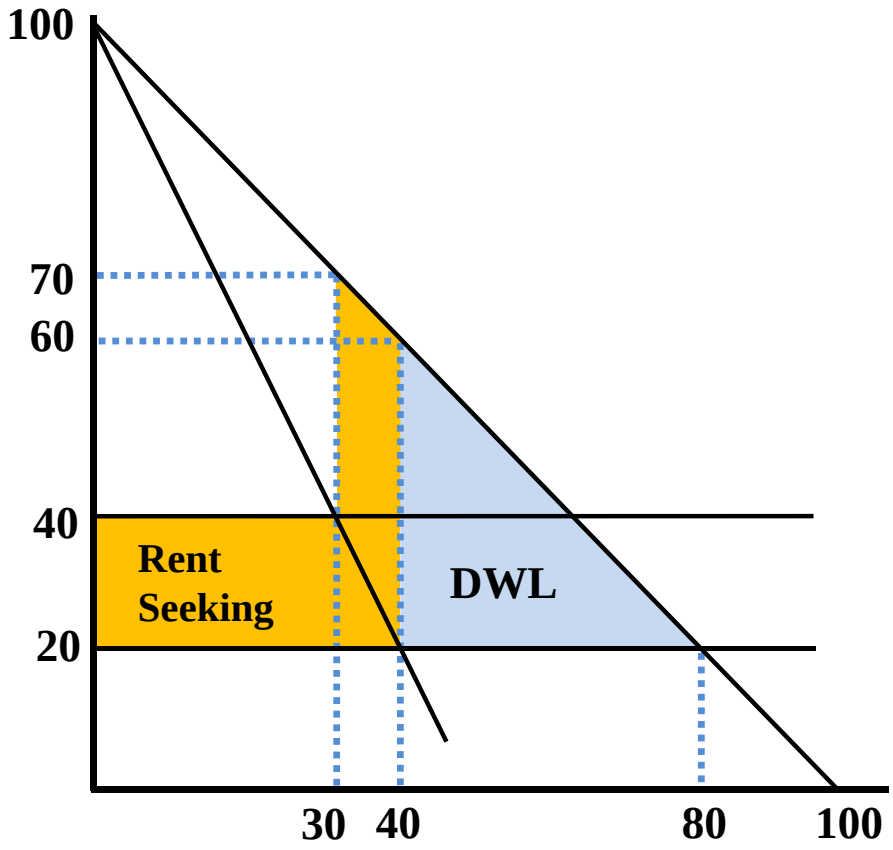
		Player 2			
		L,L	L,R	R,L	R,R
Player 1	D	3,1	3,1	0,0	0,0
	U	5,0	0,1	5,0	0,1
	X	2,2	2,2	2,2	2,2

   (b) There are two Nash equilibria: $(D, (L, R))$ and $(X, (R, R))$

5. (a) The cost to the monopolist per unit sold is 40 (production costs plus the fee charged by the public relations firm). Setting $MR = 40$ results in $Q_M^* = 30$ and $P_M^* = 70$. The marginal cost of a perfectly competitive firm is 20. Price is then $P_{PC}^* = 20$ and quantity is $Q_{PC}^* = 80$.

   (b) Total surplus under the monopoly is 1,350 and under perfect competition 3,200. Thus, the social cost of the monopoly is 1,850.

   (c) The social cost due to output restriction is defined by the usual DWL triangle when the monopolist has per unit cost of 20. That is, it corresponds to the DWL of the typical monopoly problem. The remaining portion of the social cost is due to the additional \$20 per unit and the corresponding further reduction in output. Calculate the shaded areas to find each cost. The social cost of output restriction is 800 and the social cost of rent seeking is 1,050.



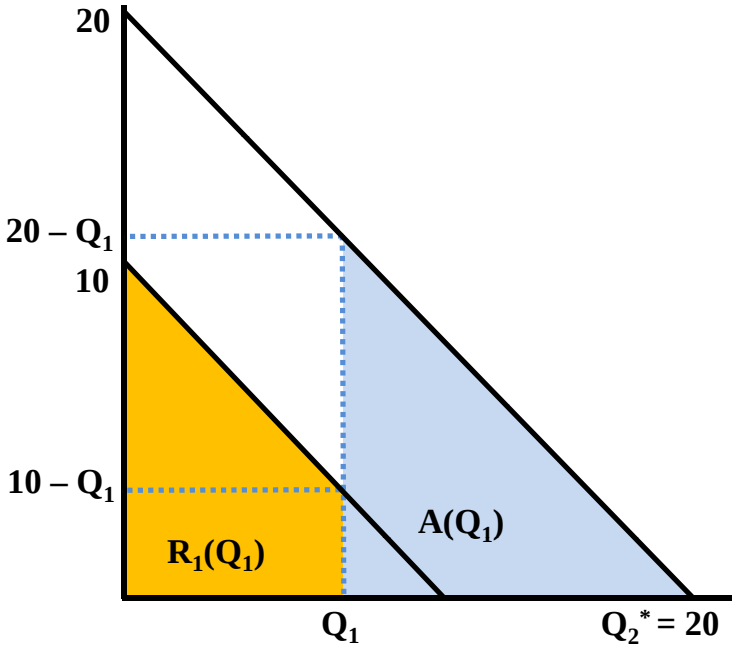
6. (a) Since the supplying firm can identify each office, we're in the world of first degree price discrimination. The firm sets price equal to MC, $P_1^* = 0$, and the rental fee is the area under the demand curve, $R_1^* = 50$.

   (b) Similar to part (a), $P_2^* = 0$ and $R_2^* = 200$.

   (c) We know that the optimal block pricing bundles under price discrimination will have the following features:

   - The quantity of the high demand package will be equal to the efficient amount of quantity for the type 2 office's demand.
   - The type 1 office will receive no consumer surplus.
   - The type 2 office must receive the same surplus from buying the higher demand package as it would the lower demand package.

   With this information we can draw the following graph:



   The fees will be a function of Q_1. From the graph, $R_1(Q_1) = (10 - Q_1)Q_1 + \frac{1}{2}Q_1^2$ and $A(Q_1) = \frac{1}{2}(20 - Q_1)^2$. The fee for the type 2 office is then $R_1(Q_1) + A(Q_1)$.

   Profit of the supplying firm is then $\pi(Q_1) = 2R_1(Q_1) + A(Q_1) = 200 - \frac{1}{2}Q_1^2$. Thus, to maximize profit the supplying firm sets $Q_1^* = 0$ or in other words only offers one package which is designed for the type 2 office: $Q_2^* = 20$ and the fee is $R_2^* = 200$, the area under type 2's demand curve.