1. Is the following statement true or false? "Perfect price discrimination involves charging each consumer a different take-it-or-leave-it price. This results in an efficient level of output."

2. Suppose that a monopoly faces a market demand given by $P = 30 - 2Q$. Its total cost is $TC(Q) = 5 + Q^2$.

   (a) Find the profit of this monopoly if it charges a uniform price.

   (b) If it can perfectly price discriminate, what would be the profit level?

3. A discriminating monopoly sells in two markets. Assume that no arbitrage is possible. The demand curve in market 1 is given by $p_1 = 100 - \frac{Q_1}{2}$, and the demand curve in market 2 is given by $p_2 = 100 - Q_2$. Let $Q = Q_1 + Q_2$ be the total production of the monopoly. The cost function of the monopoly is $TC(Q) = Q^2$.

   (a) Find the profit maximizing $Q_1$ and $Q_2$, and the total profit.

   (b) Suppose that the monopoly decides to decompose the monopoly plant into two plants, where plant 1 sells in market 1 only and plant 2 sells in market 2 only. Now, find the profit maximizing quantities in each plant and the total profit.

   (c) Suppose you become the new CEO of this monopoly and they ask you, with an explanation, whether the monopoly should decompose into two plants or not. What would your answer be?

4. Suppose a monopoly is facing two different types of consumers with inverse demand functions $P = 200 - q_1$ and $P = 150 - 2q_2$. Monopoly cannot observe who belongs to which group. Monopoly’s marginal cost is constant and zero and there is no fixed cost.

   (a) Suppose the monopoly offers two options specifying quantity and total price. The first offer is targeted at consumer 1 with $q_1 = 200$ such that it makes consumer 1 indifferent between the two offers. The second offer is targeted at consumer 2 with $q_2 = 75$ and extracts all of consumer 2’s surplus. Find the total prices in each option offered. Find the overall profit of the monopoly.

   (b) Can the monopoly increase its profit level in part (a) by offering a new pair of options? Show your work.
5. There are two types of consumers, type $\theta_1 = 1$ in proportion $1/2$ and type $\theta_2 = 2$ in proportion $1/2$. Each consumer has a net utility given as $\theta_i u(q_i) - T(q_i)$ where $q_i$ is the quantity bought, $u(q_i)$ is the utility from consuming $q_i$ and $T(q_i)$ is the total payment made for $q_i$. Let $u(q_i) = 2\sqrt{q_i}$ and $T(q_i) = A + pq_i$. Assume that the monopoly has a constant marginal cost $MC = c = 0.5$ and there are no fixed costs.

(a) Find the demand function for each type of consumer, $D_1(p)$ and $D_2(p)$. (Hint: Maximize $\theta_i u(q_i) - pq_i - A$ with respect to $q_i$)

(b) Find the consumer surplus for each type of consumer, $CS_1(p)$ and $CS_2(p)$. (Hint: $CS_i(p) = \theta_i u(D_i(p)) - pD_i(p)$)

(c) Find the profit level of the monopoly if it can perfectly price discriminate.

(d) Suppose that the monopoly cannot observe which consumer is which type. Find the optimal two part tariff, that is, find the optimal $A^*$ and $p^*$.

6. Suppose that a monopoly is facing three types of consumers, low, medium and high, $\theta_L$, $\theta_M$ and $\theta_H$, in equal proportions. Suppose that the net utility of a type $i$ consumer is given by $\theta_i u(q_i) - T_i$ where $i = L, M, H$. Suppose that the monopoly has a constant marginal cost $MC = c$ and there are no fixed costs. The monopoly offers three options (of quantity and total payment) each one targeted to one of the three types of consumers. That is, the monopoly offers $(q_L, T_L), (q_M, T_M)$ and $(q_H, T_H)$, inducing self-selection. Construct the profit maximization problem of the monopoly together with the appropriate constraints. Are there any redundant constraints? If yes, explain why.

7. Briefly explain the main argument of the reading 5 listed on the course webpage (Pricing electronic journals, Hal Varian) in no more than four sentences.