Problem Set #13
Sonoma State University
Economics 305-Intermediate Microeconomic Theory

(1) Consider the following demand and cost functions for a monopolistic firm.
The industry demand is given by \( Q = 1000 - 5P \).
The firm’s total cost is given by \( TC(q) = 300 + \frac{q^2}{3} \). Assume this represents both the short run and long run costs of the firm.

(a) Find the equilibrium price and quantity for a single price monopolist.
(b) Calculate the average total cost at the profit maximizing output.
(c) Calculate the amount of the monopoly profits per unit.
(d) Calculate the amount of the monopoly total profits.
(e) Find the competitive equilibrium.
(f) Calculate the amount of consumer surplus under the single price monopoly.
(g) Calculate the amount of consumer surplus under perfect competition. Compare consumer surplus under monopoly and perfect competition. Which is greater?
(h) Calculate the amount of producer surplus under the single price monopoly.
(i) Calculate the amount of producer surplus under perfect competition. Compare producer surplus under monopoly and perfect competition. Which is greater?
(j) Calculate the amount of the deadweight loss. What causes the deadweight loss?
(k) Show the above answers graphically.

(2) Suppose now that the monopolist engages in perfect (first degree) price discrimination.
(a) What is the equilibrium price and quantity of the perfectly price discriminating monopolist.
(b) What is the amount of consumer surplus. Compare the consumer surplus with that calculated under perfect competition and the single price monopoly.
(c) What is the amount of producer surplus. Compare the consumer surplus with that calculated under perfect competition and the single price monopoly.
(d) Calculate the amount of the deadweight loss. Compare the dead weight loss with that calculated under perfect competition and single price monopoly.
(e) Show the above answers graphically.

(3) Suppose instead that the monopolist wants to engage in second degree price discrimination by employing a two part tariff.

Suppose also that the market consists of two types of consumers that can be represented by the following demand equations.

\[
\begin{align*}
\text{Consumer Type One:} & \quad Q_1 = 500 - P_1 \\
\text{Consumer Type Two:} & \quad Q_2 = 500 - 4P_2
\end{align*}
\]

Assume that output can be produced at a constant marginal cost of $10 which also equals average total cost.
(a) If the monopolist wants to maintain both types of consumers, find the price per unit and the amount of the tariff that will maximize the monopolist's total profits.
(b) Show the above answer graphically.
(c) If the monopolist wants to retain only its most profitable consumers, find the price per unit and the amount of the tariff that will maximize the monopolist's total profits.
(d) Show the above answer graphically.
(e) Which pricing strategy would you suggest, (a) or (c)? Explain your answer.

(4) Suppose instead that the producer wants to engage in third degree price discrimination.

(a) What market conditions must exist in order to engage in third degree price discrimination?
(b) Derive the marginal revenue function for market one.
(c) Calculate the profit maximizing price, output and profits in market one.
(d) Derive the marginal revenue function for market two.
(e) Calculate the profit maximizing price, output and profits in market two.
(f) Show your answers for a-e above graphically.

(5) Which pricing strategy produces the maximum profits?