HW 3

1) Suppose a monopolist has TC = 100 + 10Q + $2Q^2$, and the demand curve it faces is p = 90 - 2Q. What will be the price, quantity, and profit for this firm?

2) A monopolist faces the (inverse) demand for its product: p = a - bQ. The monopolist has a marginal cost given by c and a fixed cost given by F.
a. Assume that F is sufficiently small such that the monopolist produces a strictly positive level of output. What is the profit-maximizing price and quantity.
b. Compute the maximum profit for the monopolist.
c. For what values of F will the monopolist earn negative profit?

3) A monopolist faces the (inverse) demand for its product: p = 50- 2Q. The monopolist has a marginal cost of 10/unit and a fixed cost given by F.
a. Assume that F is sufficiently small such that the monopolist produces a strictly positive level of output. What is the profit-maximizing price and quantity.
b. Compute the maximum profit for the monopolist in terms of F.
c. For what values of F will the monopolists profit be negative

4) Consider a monopolist with linear (inverse) demand p = a - bQ and constant average and marginal cost, c. Derive the monopolist's profit and the deadweight loss generated. Show that in such cases of linear demand and constant average and marginal cost, the deadweight loss is 50% of the monopolist's profits.

5) Suppose that market demand for a good is Q = 480 - 2p. The marginal cost is MC = 2Q. Calculate the deadweight loss resulting from a monopoly in this market.

6) A monopolist faces the inverse demand for its output:

$p = 30 - Q$

The monopolist also has a constant marginal and average cost of $4/unit. The government is seeking ways to collect tax revenue from the monopolist and faces two proposals:

i. Impose a specific tax of *t* on the monopolist.
ii. Impose an ad valorem tax of *a* on the monopolist.

a. Suppose the government imposes a 20% ad valorem tax on the monopolist. What price and quantity does the monopolist choose and how much revenue does the government generate from the tax?
b. Rather than an ad valorem tax, what is the government's revenue from a specific tax of *t* imposed on the monopolist? Your answer should be in terms of '*t*'.
c. Show that a specific tax of $3.70/unit generates the same revenue as a 20% ad valorem tax (approximately).
d. Which tax has a greater distortion on the monopoly output?

7) The SSS Co. has a patent on a particular medication. The medication sells for $1 per daily dose and marginal cost is estimated to be a constant at 20¢. Assuming linear demand and marginal cost curves, use this information to estimate the deadweight loss from monopoly pricing if the firm currently sells 1,000 doses per day. Can this loss be justified?

8) Suppose you are a monopolist operating two plants at different locations. Both plants produce the same product; Q_1 is the quantity produced at plant 1, and Q_2 is the quantity produced at plant 2. You face the following inverse demand function: $P = 500 - 2Q$, where $Q = Q_1 + Q_2$. The cost functions for the two plants are $C_1 = 25 + 2Q_1^2$; $C_1 = 20 + Q_2^2$.
a. What are your marginal revenue and marginal cost functions?
b. To maximize profits, how much should you produce at plant 1? At plant 2?

c. What is the price that maximizes profits?
d. What are the maximum profits?

9) A monopoly has two production plants with cost functions $C_1 = 50 + 0.1\ Q_1^2$ and $C_2 = 30 + 0.05\ Q_2^2$. The demand it faces is $Q = 500 - 10\ P$.

a. What is the profit maximizing level of output?

b. What is the profit maximizing price?