

Intermediate Microeconomics
Homework 5

1. Consider a Cournot duopoly with the inverse demand $P = 260 - 2Q$. Two firms compete choosing their quantities. Both firms have constant marginal and average cost $MC = AC = 20$.

- a. Find each firm's best response function.
- b. Find the Cournot equilibrium.
- c. Plot the best response curves and illustrate the equilibrium point.

2. Find the Nash equilibrium of the game below:

		Firm B		
		Low Price	Medium Price	High Price
Firm A	Low Price	4, 4	6, 3	8, 2
	Medium Price	3, 6	5, 5	4, 3
	High Price	2, 8	3, 4	3, 3

3. A monopolist faces a demand curve given by $Q = 70 - P$. The monopolist's marginal revenue function is given by $MR = 70 - 2Q$.

a. If the monopolist can produce at constant average and marginal costs of $AC = MC = 6$, what output level will the monopolist choose in order to maximize profits? What is the price at this output level? What are the monopolist's profits?

b. Assume instead that the monopolist has a cost structure where total costs are described by $TC = 0.25Q^2 - 5Q + 300$ and marginal cost is given by $MC = 0.5Q - 5$. With monopolist facing the same market demand and marginal revenue, what price-quantity combination will be chosen now to maximize profits? What will profits be?

4. A pharmaceutical firm is marketing a patented drug it has developed (the firm therefore has monopoly rights over the drug). The demand for the drug is given by $Q = 8000 - 8P$ ($MR(Q) = 1000 - \frac{Q}{4}$), where P is the price of the drug (in cents), and the total cost of production is $TC(Q) = Q^2 + 100Q + 10000$ ($MC(Q) = 2Q + 100$).

a. Calculate the (monopoly) price of the drug, P^M , and the quantity sold, Q^M .

b. Suppose now that the drug's patent expires, and other pharmaceutical firms can begin producing it. Assume this result in a competitive supply of the drug, and calculate the long-run competitive equilibrium price and aggregate quantity. Compare these to those you found in part a.

c. Using a diagram, compare the consumer surplus between parts (a) and (b). In which case is the consumer surplus higher? Why do you think the patent would have been granted in the first place?

5. Suppose a company has a monopoly on a game called Monopoly and faces a demand curve given by $Q_T = 100 - P$ and a marginal revenue function given by $MR = 100 - 2Q_T$ where Q_T equals the combined total number of games produced per hour in the company's two factories ($Q_T = q_1 + q_2$). If factory 1 has a marginal cost function given by $MC_1 = q_1 - 5$ and factory 2 has a marginal cost function given by $MC_2 = 0.5q_2 - 5$, how much total output will the company choose to produce and how will it distribute this production between its two factories in order to maximize profits?