

EC302 - INTERMEDIATE MICROECONOMICS
Loyola University
Fall 2017

Problem Set 4
Discussion Due Date: December 11, 2017

1. A firm produces output q in a competitive industry that is in long run equilibrium. Now, suppose that an output tax is levied on this firm *only*, so that the firm must pay $\$t$ to the government per unit of output produced. Assume that the marginal cost of the firm is increasing in output and its average cost has the standard, "u" shape.

- a. Illustrate in a diagram the effect of the tax on the firm's costs and its short run and long run supply curves.
- b. Suppose that the tax is levied on all firms in this industry. Illustrate the effect of the tax on the short run equilibrium price and output in this industry.
- c. In the long run, does the equilibrium industry price rise by the full amount of the tax? Why or why not?

2. Suppose $Q = K^{0.2}L^{0.8}$. If the firm is a price taker and buys its inputs at the given market price prove that total wages paid by the firm in the long run will be equal to 80% of total revenue.

3. A monopolist faces the demand curve $P = 11 - Q$, where P is measured in dollars per unit and Q in thousands of units. The monopolist has a constant average cost of \$6 per unit.

Draw the average and marginal revenue curves, and the average and marginal cost curves. What are the monopolist's profit-maximizing price and quantity, and what is the resulting profit? Calculate the firm's degree of monopoly power using the Lerner index (look it up).

4. Fly-by night airways (FNA) fly only one route: Baltimore to Nowhereville. The demand for each flight on this route is $Q = 500 - P$. FNA's cost of running each flight is \$30,000 (TFC) plus \$100 per passenger (MC).

a) What is the profit-maximizing price FNA will charge? How many people will be on each flight? What would FNA's profit be for each flight?

b) The company accountant informs the airline that the fixed costs per flight are in fact \$41,000 instead of \$30,000. Will the airline stay in this business long?

c) Wait! FNA has figured out that two different types of people fly to Nowhereville. Type A is business people who have a demand of $Q = 260 - (0.4)P$. Type B is students whose total demand is $Q = 240 - (0.6)P$. The students are easy to spot, so FNA decides to charge them different prices. What price does FNA charge the students? What price does it charge the other customers? How many of each type are there on each flight?

5. Suppose that two identical firms produce widgets (new product) and that they are the only firms in the market. Their costs are given by $C_1 = 30Q_1$ and $C_2 = 30Q_2$, where Q_1 is the output of Firm 1 and Q_2 the output of Firm 2. Price is determined by the following demand curve:

$$P = 150 - Q \quad \text{Where } Q = Q_1 + Q_2.$$

Find the Cournot-Nash equilibrium. Calculate the profit of each firm at this equilibrium.

6. Some experts have argued that there are too many brands of beverages in the market. Given an argument to support this view. Give an argument against this view.

7. The following payoff matrix represents the long-run payoffs for two duopolists faced with the option of buying or leasing buildings to use for production. Determine whether any dominant strategies exist and whether or not there is a Nash equilibrium.

		Firm 1	
		Lease Building	Buy Building
Firm 2	Lease	F1 = 500 F2 = 500	F1 = 750 F2 = 400
	Buy	F1 = 300 F2 = 600	F1 = 600 F2 = 200

8. The trade dispute arising between the USA and China can be looked at as a form of prisoner's dilemma. The USA's position is that China is unfair and has asked the WTO to impose tariffs on Chinese textiles. If the US wins the case China may consider retaliatory policies to close their market.

The two countries are considering policies to open or close their import markets. The payoff matrix is shown here:

	CH Open Markets	CH Close Markets
US Open Markets	50, 50	20, 20
US Close Markets	-50, 20	10, 10

a. Assume that each country knows the payoff matrix and believes that the other country will act in its own interest. Does either country have a dominant strategy? What will be the equilibrium policies if each country acts rationally to maximize its welfare?

b. Now assume that China is not certain that the US will behave rationally. In particular, China is concerned that US politicians may want to penalize China even if that does not maximize US welfare. How might this affect China's choice of strategy? How might this change the equilibrium?