

Econ 100A: Intermediate Microeconomics
Problem Set 5
Due in class Friday December 2

1. A firm's marginal cost as a function of quantity is given by $MC(q) = 2q$. The inverse market demand curve $p = 60 - 2q$.
 - a. Pretend the firm acts as though it is facing a perfectly competitive market (it is a price taker). What is the market equilibrium price and quantity?
 - b. Find the producer and consumer surplus under the perfect competition scenario.
 - c. Now assume that the firm behaves as a monopolist. How much will the firm produce? What will be the price it will charge?
 - d. Find the producer and consumer surplus in the monopoly scenario. What is the deadweight loss?
 - e. In a graph, depict the competitive equilibrium, drawing the demand and supply curves and shading the areas of consumer and producer surplus. In a separate graph, draw the monopolist's marginal revenue curve and marginal cost curve, and draw the demand curve. Shade the areas representing consumer surplus, producer surplus, and deadweight loss.
 - f. What is the elasticity of demand at the price charged by the monopolist? Use this elasticity to find the firm's markup of price over marginal cost.

2. In the late 1990s, Boeing and Airbus, the only two realistic competitors in the production of very large aircraft, were both contemplating introducing a superjumbo jet. Boeing enjoyed a cost advantage in developing such a plane, as it would be an extension of an existing large plane it already made, however introducing the plane would cannibalize sales from its existing product line.

Assume that if both firms produced the plane, both Boeing and Airbus would lose \$250 million. If neither firm produced a plane, the payoffs to each would be zero. If Airbus produces the plane when Boeing does not, Boeing loses \$100 million due to Airbus stealing some business from Boeing's existing line of aircraft, while Airbus makes \$750 million. If Boeing enters, Airbus loses \$25 million, while Boeing makes \$400 million.

- a. Suppose the two firms make the entry decision simultaneously. Write down the payoff matrix. Find the Nash equilibrium or equilibria, if any exist.
- b. Now assume that the game is sequential, and Boeing is able to move first. Write the game tree. What is the equilibrium of this game?
- c. As it turned out, Airbus made a credible commitment to producing the superjumbo jet. How would this type of commitment change your answer to b?