

## **Solution to Midterm 2—Lecture 1 (9:05-9:55)**

**50 minutes**

### **Econ 1101: Principles of Microeconomics**

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Question 1 (24 points) Answer the following in the space provided below. Put your entire answer on a **single page**. If you mess up with the space provided, start completely over on the back page and indicate that you are doing this. Points will be deducted if your answer is not legible. Answer both parts of the question.

In Economics 1101 we have learned that under certain conditions, the free market—with no taxes or subsidies—is Pareto efficient. In other words, the free-market maximizes the total surplus.

- a) Explain then why some economists argue a tax on gasoline might be in the overall interest of the United States. (Provide two distinct reasons in your answer.)
- b) An alternative to a gas tax is a policy to distribute “Tradeable Gasoline Rights.” (TGR) Would a TGR policy accomplish the same goals as a tax? In what way would it be different?

Example Answer:

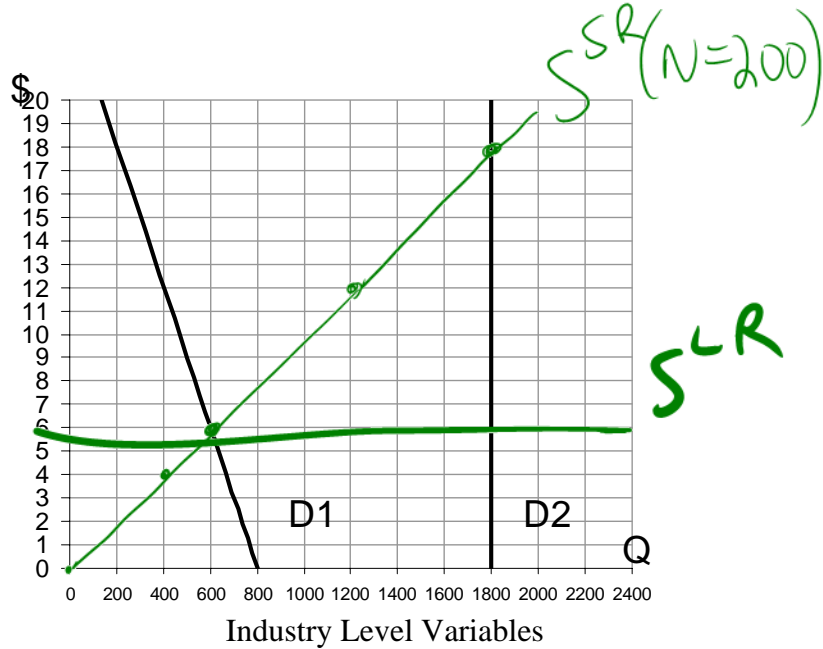
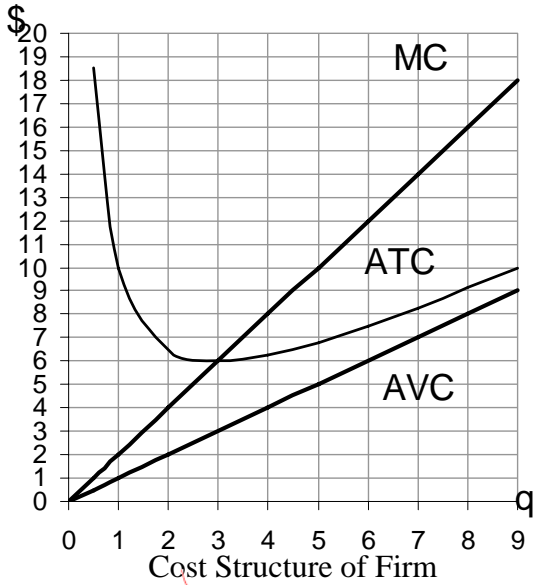
*The consumption of gasoline and other carbon sources of energy impose a negative externality on the rest of the world because it contributes to global warming. Because of the externality, the result that the free market is Pareto efficient does not apply and the market quantity is too large. If the United States were to increase the federal gas tax, in the long run oil consumption in the U.S. would decline. There would be a noticeable impact on global consumption of oil since the United States accounts for 25 percent of world consumption.*

*A second impact of an increase in the U.S. gas tax would be a reduction in world oil prices. Again this is a consequence of the large U.S. share of the world market. A fall in world oil prices is in the interest of the United States since we import most of the oil we consume.*

*A TGR policy is just like a tax in that it increases the opportunity cost of using gasoline. Like a gas tax, it will cut consumption. The only difference is in the distribution of surplus. With a tax, surplus goes to the government. With the TGR policy, the equivalents of the tax proceeds go to whoever is allocated the TGR.*

**Question 2.** (28 points)

Each widget firm has the cost structure illustrated in the figure on the left below. Two different cases for industry demand are illustrated in the figure on the right. Please use the lines in the graph paper to determine the numbers you need to do the problem. For example, you should be able to see in the figure that ATC at  $q = 9$  is \$10.



(a) Draw in the long-run supply curve on the right-hand side graph and label it  $S^{LR}$ .

(b) Two possibilities for demand are illustrated on the right, a low demand curve D1 and a high demand curve D2. Determine the long-run competitive equilibrium for each case by completing the table below:

		Demand	
Variable	Definition	D1	D2
$P^{LR}$	Long-run Industry Price	6	6
$Q^{LR}$	Long-run Industry Quantity	600	1800
$q^{LR}$	Long-run output per firm	3	3
$N^{LR}$	Long-run number of firms	200	600

(d) Fill out the table below. The first column to be completed is the short-run supply for a *firm* in the industry for 4 different prices. The second column is the short-run *industry* supply when the number of firms is *fixed* at  $N = 200$ .

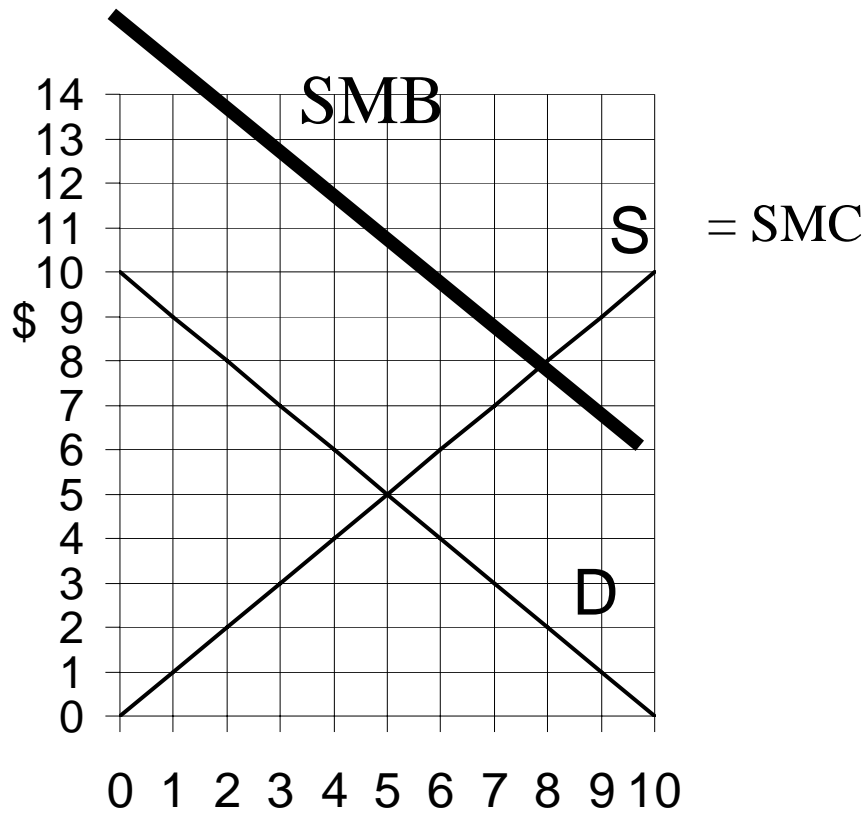
Price	Firm Supply (Short-Run)	Industry Supply (Short-Run with $N = 200$ firms)
4	2	400
6	3	600
12	6	1200
18	9	1800

(e) **Plot** the short-run industry supply when  $N = 200$  firms is fixed in the short run and label it  $S^{SR}(N=200)$ . Suppose that the demand is given by  $D_2$ . The short-run equilibrium price is

18. In the short run, the profit of each firm is \_\_\_\_\_.

$$9 \times [P - ATC] = 9 [18 - 10]$$

$$= 9 \times 8 = 72$$



Question 3 (13 points)

The demand curve and the supply curve for widgets are given by D and S above. The social marginal benefit curve is given by SMB above.

(a) Given the above information, a widget must be a good that has **(circle one)**

- Positive externalities     
  Negative Externalities     
  No Externalities

(b) The equilibrium quantity is 5 while the socially efficient quantity is 8.

(c) A policy that results in the socially efficient quantity is a **(circle one)**:

- Pigouvian Tax     
  Pigouvian Subsidy     
  Keynesian Tax     
  Keynesian Subsidy

(d) The dollar value of the tax/subsidy that results in the socially efficient quantity is \$6.

Question 4 (25 points)

A monopolist faces the demand curve illustrated below. Assume for parts (a) through (d) that the monopolist sets a uniform price.

(a) **Draw** in the marginal revenue curve and label it.

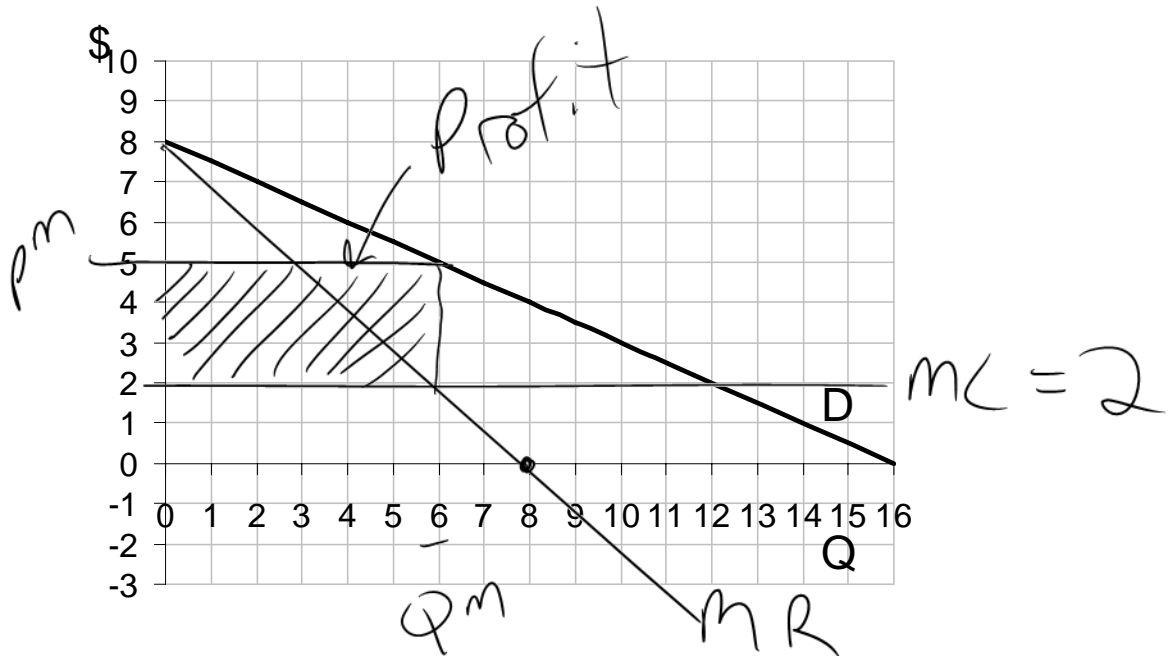
(b) Suppose the marginal cost is  $MC = 2$ . Draw the MC curve in the figure and label it.

(c) The profit maximizing monopoly quantity is 6 and price is 5. **Label** these on your graph.

(d) Suppose the fixed cost is zero,  $FC = 0$ , so  $ATC = MC = 2$ . The monopoly profit is 18. Illustrate the monopoly profit in your graph.

(e) Suppose the fixed cost is  $FC = 16$ . This situation is called (**circle one**)

- Decreasing returns to scale
- Constant returns to scale
- **Natural Monopoly**
- Natural Duopoly



f) Suppose the fixed cost is  $FC = 19$ . Suppose in the long-run the firm can exit the industry and avoid paying the fixed cost. What happens in this industry if uniform pricing is the only feasible price strategy? Explain how a Pareto improvement might result if the firm could price discriminate.

*If uniform pricing is the only feasible price strategy then in the long run the firm will surely exit. Revenue minus variable cost of 18 will not cover the 19 in fixed cost.*

*If the firm could price discriminate, it could potentially increase revenue net of variable costs above 19. If so, it will stay in the market. The firm would be better off because it would make a profit. Consumers would be better off since they would have access to a product that would not exist without price discrimination.*

Question 5 (6 points)

D1 is running a sealed bid auction and is willing to pay \$9 for one widget. S4 and S5 both have a cost of \$4 to make one widget. All bids must be round dollar bids. D1 accepts the lowest bid unless it is a tie in which case he determines the winner by a coin flip.

(a) If S4 and S5 cooperate and can successfully act like a cartel, then S4 will bid \$9 and S5 will bid \$9.

(b)  True or  False (circle one) Suppose the auction happens only one time and S4 and S5 will never see each other again. S4 bidding \$5 and S5 bidding \$5 is a Nash equilibrium of this game.

(c)  True or  False (circle one) Cooperation like in (a) is **more** likely to happen if bidding is **secret** so that it is **difficult** for a bidder to immediately respond to price cuts by the rival bidder.

*Question 6* (6 **bonus** points)

Consider a situation where an entrepreneur is considering whether to start a new airline and enter “market A” which is currently dominated by a large existing airline (the incumbent). If the entrant comes in, suppose it is possible for the incumbent to try to fight it off. However, fighting is very costly for the incumbent. The incumbent would actually make more money in market A by accommodating the entrant (i.e learning to live with it) rather than fighting it off.

(a) **True** or **False** (circle one) Suppose the incumbent **does not** have to worry about other potential entrants in other markets where the incumbent operates. Game theory tells us that if the entrant were to come into market A, the incumbent would be likely to accommodate the entrant.

(b) **True** or **False** (circle one) Suppose the incumbent **does** have to worry about the possibility of entry into other markets where the incumbent operates. Then the incumbent might choose to fight an entrant in market A to develop a reputation for being tough because this might discourage entry in other markets.

(c) DeBeer's is currently controlled by the (circle one)

- Rhodes family

- Oppenheimer family

- Tarhan family

- DeBeer family

- Gates family