

**Economics 2106H** (Spring 2009) — Prof. Greg Trandel — Homework Assignment # 2  
Answers due: Beginning of class, Thursday, February 26th.

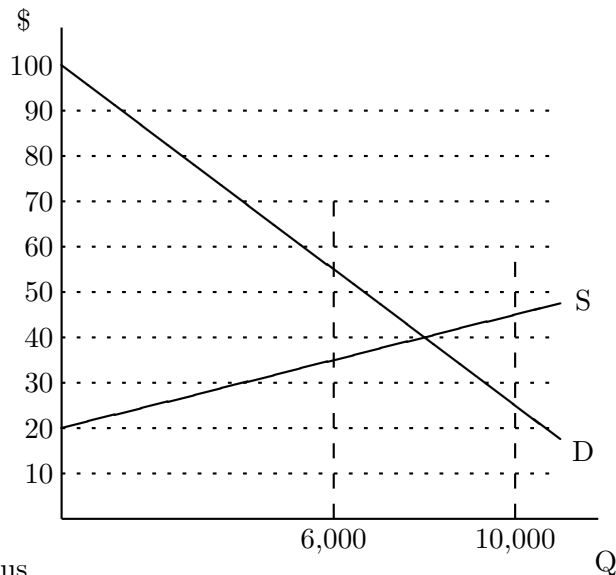
**Instructions/Information:** While this assignment probably looks very long, many of the questions require only very short answers.

For now, the assignment is to **hand in answers for all questions through #19, plus parts of question #20**. How much of the last question is assigned depends on how much material we cover by the end of class on Tuesday, Feb. 24th. At the end of that class, I'll let you know (and I'll also post on the web page) how much of question #19 is assigned.

1. People respond to incentives. So-called “three-strikes-and-you’re-out” laws have been enacted in many states. A typical version of such a law imposes a “first strike” against a person who is convicted of a serious crime (examples include assault, rape, burglary, or selling drugs to a minor). After a person has one such conviction, however, a conviction on any felony offense — including possession of marijuana or petty theft — will give the person a “second” and then a “third” strike. When an offender receives a third strike, he or she is given a minimum 25-year prison sentence. The severity of such laws may lead some people to give up crime. [Of course, that is part of the justification for creating the law.] On the other hand, suppose that a person who already has two strikes isn’t deterred from committing crime. How might the existence of a three-strike law affect the the severity of the offenses committed by such criminals? Was this change in behavior an intended goal of those who supported three-strike laws?
2. Suppose that good growing conditions result in an unusually large pumpkin crop. Draw a supply-and-demand diagram to illustrate the effect of the good harvest on the market for pumpkins.
3. Suppose that potatoes become quite a bit more expensive. Draw a supply-and-demand diagram to illustrate the effect of this price change on the market for french fries.
4. A recent news story (*Las Vegas Review-Journal*, February 11, 2009) reported that the “number of people who visited Las Vegas fell 4.4 percent [from 2007 numbers] to 37.5 million in 2008.” In addition, the “average daily room rate fell 9.8 percent to \$119 for the year.” [Note that the December, 2007 to December, 2008 drop in visitors was 14.2%.] Draw a simple diagram that indicates what sort of supply or demand event would cause such a combination of changes in price and quantity.
5. A story in the June 13, 2007 edition of *The New York Times* reports on the increasing number of restaurants that serve high-fat varieties of meat. One person quoted in the article — “Zak Pelaccio, the chef at the tellingly named restaurant Fatty Crab” — reports the following: three years ago, when his restaurant opened, “I could buy lamb ribs for a dollar a pound. Now it’s \$2.50.” Draw a supply-and-demand diagram to illustrate how a rise in the popularity of high-fat meats have affected their price.
6. Hubbard and O’Brien, 2nd ed., chapter 3, page 96, question 4.13.
7. Suppose you observe that Americans are buying more chicken now than they had bought in the past. From this information *alone*, can you determine whether it was the demand for, or the supply of, chicken that changed? How would knowing the direction of the change in the market equilibrium price of chicken enable you to know which curve shifted (or, if they both shifted, to know which curve shifted more)?
8. Over the past several years, technology improvements have lowered the cost of manufacturing DVD players. Draw a supply-and-demand diagram to illustrate how this change has affected the market for DVD players. Using a second supply-and-demand diagram, illustrate how the change in the DVD player market affected the market for VCR players. [This is a modified version of a question from the textbook.]

9. Hubbard and O'Brien, 2nd ed., chapter 3, page 97, question 4.16.
10. Per-foot rental prices for retail space (in, for example, malls or shopping centers) typically hit their lowest value in the first quarter of the year (i.e., in the January-March period). Explain what typical behavior of struggling retail chains might explain this pattern.
11. Hubbard and O'Brien, 2nd ed., chapter 3, page 95, question 4.6. [Not in first edition — I'll put the question on the class web page.]
12. (i) Draw a supply-and-demand diagram, and illustrate (in the simplest possible way) the effect of the current economic recession on the market for oil.  
(ii) Draw a second supply-and-demand diagram, and — assuming the diagram's starting position already captures the effect of the recession — illustrate (in the simplest possible way) what would happen in the oil market if the OPEC producers cut their output levels.
13. Suppose that poor weather conditions lead to a particularly small peanut crop, which thereby leads to a rise in the price of peanuts. At the same time, some people become increasingly concerned about a harmful medical condition that can affect certain people who eat peanut butter. How do these two events affect the equilibrium outcome in the market for peanut butter?
  - (a) The peanut price rise causes which curve in the peanut butter market to shift? In which direction?
  - (b) The health concerns causes which curve in the peanut butter market to shift? In which direction?
  - (c) Considering both effects (without knowing the strength of either), what can be determined about how the equilibrium price and the equilibrium quantity of peanut butter will change?
14. Hubbard and O'Brien, 2nd ed., chapter 3, page 97, question 4.17.

15. Use the accompanying figure to answer this question.



- (a) If, for some reason, there are currently only 5,999 units of the relevant good being produced, what surplus would result from the production of (only) unit #6,000? [In other words, by how much would (total) economic surplus created in this market change if unit #6,000 was produced?
  - (b) If, for some reason, there are currently 9,999 units of the relevant good being produced, what surplus would result from the production of (only) unit #10,000? [In other words, by how much would (total) economic surplus created in this market change if unit #10,000 was produced?
16. Assume that the demand curve for a certain good has the formula  $240 - \frac{3}{100}Q$  (or  $240 - .03Q$ ), while the supply curve for that same good has the formula  $80 + \frac{1}{100}Q$  (or  $80 + .01Q$ ).
    - (a) Draw these demand and supply curves.

- (b) Assuming for now that there are no restrictions on the market, find numeric answers for (equilibrium) quantity, (equilibrium) price, and the areas that measure consumer surplus, producer surplus, and economic surplus.
- (c) Now, assume that the government imposes a “maximum-price” law on this market. The law states that the good cannot be sold at a monetary price above \$110. Assuming for now that the law is followed, how many units of the good will be sold?
- (d) Continuing to assume that the good is sold at Price = \$110, and at the quantity you found in (c), what is the numeric value of producer surplus? What is the largest-possible value for consumer surplus? For economic surplus?
- (e) Now, assume that those who *really* want the good must “stand in line” in order to get it. The “standing-in-line costs” that these people experience raise the “effective price” of this good to the largest value at which people are still willing to buy the quantity found in part (c). What is this “effective price”?
- (f) With the effective price at this level, what is the (smallest-possible) value of CS? Of PS? Of ES? What happened to economic surplus that disappeared between parts (d) and (e)?
- (g) Suppose that the price ceiling law described above can be readily evaded because the officials who are supposed to enforce it are corrupt. In practice, the producers and consumers of this good can engage in any transaction they find mutually beneficial *as long as* a \$3 bribe is paid to the authorities for every unit that is sold. In this situation, how many units are produced and sold? What is consumer surplus? What is producer surplus? What is economic surplus? Did you have to make a judgment call to answer the last question? If so, what was it?
17. In the poor, still-developing country of Ambiviland, a U.S.-owned company — Mandalay Industries — set up a manufacturing plant, and hired factory workers at a daily wage of 200 kinars (which is about \$5 in U.S. currency). This daily wage was high enough to attract more than enough Ambivilanders to fill all Mandalay’s job openings. The decisions about which job applicants are actually hired to work in the plant are made by local Ambivilander managers (who are paid 600 kinars per day). Mandalay might open more plants in Ambiviland.
- Some people in the U.S. have protested, claiming that Mandalay is acting unfairly by paying its workers (what the protestors view as) such low wages. As a result of public pressure, Mandalay has recently announced that it will offer a raise to all its production workers (but only its production workers), in Ambiviland and will start to pay them 300 kinars per day.
- (a) What do you expect to happen (over the next few years) to the number of people applying for work at Mandalay relative to the number hired by Mandalay?
- (b) The pay raise described above offers no direct benefit to Ambivilander managers. Nevertheless, those managers might become personally much better off as a result of the policy change. Explain why.
18. Brian Burton won a prize in a contest: a ticket to an Atlanta Thrashers home hockey game. Assume that the ticket couldn’t be resold, nor could it be exchanged for a ticket to a game on a different night. Brian’s best possible alternative activity for that night was to see a concert by the band Maximo Park. Assume that concert tickets sell for \$12, and that Brian would have been willing to pay up to \$25 to see this band. What — measured in dollars — would have been Brian’s opportunity cost of going to the Thrashers game? *[Note: the question doesn’t provide enough information for you to decide whether Brian went to the game or to the concert; you don’t need to know this to answer the question that is asked.]*
19. Hubbard and O’Brien, 2nd ed., chapter 11, page 406, question 3.3. *[Note: just answer the numeric questions — you don’t have to draw any graphs.]*

20. When a certain firm produces  $q$  units of a product, its total cost of production is given by this formula:  $TC = 1600 + 5q + \frac{q^2}{400}$ . For any particular unit  $q$ , the firm's marginal cost of producing that unit equals this formula:  $MC = 5 + \frac{q}{200}$ . (or, alternatively:  $MC = 5 + .005q$ ).

- (a) (*Optional; only for those of you comfortable with calculus.*) Given the formula for  $TC$ , use calculus to explain why the formula for  $MC$  is correct.
- (b) What is this firm's fixed cost? What is the formula for its variable cost of producing  $q$  units?
- (c) What is the formula for this firm's average total cost of producing  $q$  units? For this firm's average variable cost of producing  $q$  units? For its average fixed cost of producing  $q$  units?
- (d) Use the total cost formula to find the  $TC$  of producing 199 units (i.e., find  $TC$  when  $q = 199$ ). Find the  $TC$  of producing 200 units. Considering the change in total cost, what is this firm's marginal cost of producing its 200th unit of output?
- (e) Using the marginal cost formula, what is the firm's  $MC$  of producing its 200th unit of output?
- (f) Do the two approaches to finding marginal cost produce answers that are "close enough" to each other? [*The answer to this question should be "yes".*]

(g) Complete a table like the accompanying one.

Unit	Fixed Cost	Variable Cost	Total Cost	Average Variable Cost	Average Total Cost	Marginal Cost
200	1600	1100	2700	5.5	13.5	6
400						
600						
800						
1000						
1200						
1400						

- (h) Show that  $ATC$  hits its lowest level at  $q = 800$ . This can be done in *either* of two different ways.
  - (i) Since we know that  $ATC = MC$  when  $ATC$  is at its minimum, one method is to solve  $ATC = MC$  for  $q$ .
  - (ii) An alternative method is to use calculus to directly find the  $q$  at which the  $ATC$  formula is minimized. [*Those who haven't taken calculus should obviously use method (i).*]
- (i) On the attached sheet, use the values in the table to graph the  $ATC$  curve, the  $AVC$  curve, and the  $MC$  curve (some of these are "lines" rather than "curves".) [*Make sure your graphs are based on the actual cost formulae in this question, rather than the shape of "typical" cost curves.*]
- (j) Assume that this firm is a price taker. What then must be true about its marginal revenue from selling any unit?
- (k) Since the market price is currently unknown, let that price be represented by the general term  $P$ . Find a general formula for the quantity of output produced and sold by this firm at any possible value of the market price. [In other words: find a formula for this firm's supply curve.] To do so, find a formula of the form  $q = a(P - b)$  (the equations used in this problem guarantee the formula will be a straight line), where you've determined what  $a$  and  $b$  must be. To find the needed formula, start with the rule for profit-maximizing behavior, substitute in the proper terms, and solve for  $q$ . [*Note: this is the key step in solving the rest of this problem. If you've spent some time thinking about how to write the needed formula, and find yourself stuck - feel free to contact Prof. Trandel for a hint.*]

- (l) Suppose the market consists of 100 firms identical to this one. Let  $Q$  be the market quantity. Find the formula for the quantity supplied by the market at any possible market price (i.e., find a formula of the form  $Q^s = -c + dP$ ). [Given that a negative value for quantity doesn't really make sense, the  $Q^s = -c + dP$  formula holds only for appropriate values of  $Q$  and  $P$ .] The formula you just found is the market (short-run) supply curve.
- (m) Suppose that market demand (writing the quantity demanded as a function of the market price) is  $Q^d = 150,000 - 5000P$  (for  $0 \leq P \leq 30$ ). For the purpose of graphing demand, it's more convenient to express demand as  $P = 30 - \frac{1}{5000}Q$  (or, alternatively  $P = 30 - .0002Q$ ). Show that these two ways to express demand are equivalent.
- (n) Rewrite the formula you found for market supply so that it is the form  $P = e + fQ$ .
- (o) Also on the attached sheet, illustrate the market demand and market supply curves from parts (m) and (n). Show the equilibrium market price ( $P^*$ ) and equilibrium market quantity ( $Q^*$ ).
- (p) Use the formulae for market supply and market demand to find numeric values for  $P^*$  and  $Q^*$ .
- (q) Given the market equilibrium price, find a numeric value for the quantity of output ( $q^*$ ) a single firm wishes to produce and sell.
- (r) Given your previous answers, find the profit earned by a single firm using the  $\Pi = TR - TC$  formula. Find the profit earned by a single firm using the  $\Pi = (P - ATC)Q$  formula.
- (s) On the graph of the firm's situation you drew for part (i), show the market price ( $P^*$ ), the profit-maximizing quantity ( $q^*$ ), and the area that represents profit.
- (t) Explain why this firm doesn't stop its production at the quantity at which its average total cost of production reaches its lowest possible level.

