

ECON 103, 2008-2  
ANSWERS TO HOME WORK ASSIGNMENTS

Due the Week of June 16

**Chapter 7**

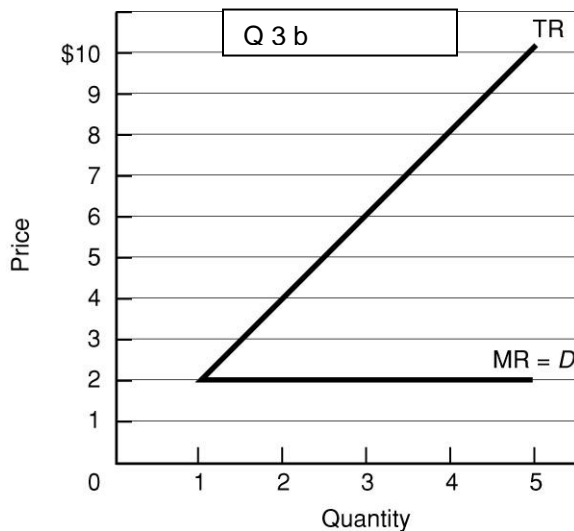
WRITE [3]: Use the following demand schedule to determine total and marginal revenues for each possible level of sales:

Product Price	Quantity Demanded	Total Revenue	Marginal Revenue
\$2	0	\$0	-
2	1	2	\$2
2	2	4	2
2	3	6	2
2	4	8	2
2	5	10	2

- What can you conclude about the structure of the industry in which this firm is operating? Explain.
- Graph the demand, total-revenue, and marginal-revenue curves for this firm.
- Do the demand and marginal-revenue curves coincide? If so, why? If not, why not?
- “Marginal revenue is the change in total revenue associated with additional units of output.” Explain in words and graphically, using the data in the table.

ANS: (see table for TR & MR)

- The industry is purely competitive—this firm is a “price taker.” The firm is so small relative to the size of the market that it can change its level of output without affecting the market price.
- See graph.
- The firm’s demand curve is perfectly elastic; MR is constant and equal to P. Therefore, the marginal revenue curve and the demand curve coincide (i.e., they are identical)



- Table: When output (quantity demanded) increases by 1 unit, total revenue increases by \$2. This \$2 increase is the marginal revenue. Figure: The change in TR is measured by the slope of the TR line, 2 (= \$2/1 unit).

WRITE [4] Assume the following unit-cost data are for a purely competitive producer:

Q	AFC	AVC	ATC	MC
0				
1	60.00	45.00	105.00	\$45
2	30.00	42.50	72.50	40
3	20.00	40.00	60.00	35
4	15.00	37.50	52.50	30
5	12.00	37.00	49.00	35
6	10.00	37.50	47.50	40
7	8.57	38.57	47.14	45
8	7.50	40.63	48.13	55
9	6.67	43.33	50.00	65
10	6.00	46.50	52.50	75

- At a product price of \$56, will this firm produce in the short run? Why, or why not? If it does produce, what will be the profit-maximizing or loss-minimizing output? Explain. What economic profit or loss will the firm realize per unit of output.
- Answer the questions of 4a assuming that product price is \$41.
- Answer the questions of 4a assuming that product price is \$32.
- In the table below, complete the short-run supply schedule for the firm (columns 1 and 2) and indicate the profit or loss incurred at each output (column 3).

(1) Price	(2) Q supplied by single firm	(3) Profit (+) or Loss (-) to single firm (\$)	(4) Total quantity supplied by 1,500 firms
\$26	0	-60	0
32	0	-60	0
38	5	-55	7,500
41	6	-39	9,000
46	7	-8	10,500
56	8	+63	12,000
66	9	+144	13,500

- Explain: "That segment of a competitive firm's marginal-cost curve which lies above its average-variable-cost curve constitutes the short-run supply curve for the firm." Illustrate graphically.
- Now assume there are 1500 identical firms in this competitive industry; that is, there are 1500 firms, each of which has the same cost data shown in the table. Complete the industry supply schedule (column 4).

- g. Suppose the market demand data for the product are as follows:  
What will be the equilibrium price? What will equilibrium output be for the industry? For each firm? What will profit or loss be per unit? Per firm? Will this industry expand or contract in the long run?

Price	Q demanded
\$26	17,000
32	15,000
38	13,500
41	12,000
46	10,500
56	9,500
66	8,000

ANS:

(a) Yes, \$56 exceeds AVC (and ATC) at the loss—minimizing output. Using the  $MR = MC$  rule it will produce 8 units. Profits per unit = \$7.87 (= \$56 - \$48.13); total profit = \$62.96.

(b) Yes, \$41 exceeds AVC at the loss—minimizing output. Using the  $MR = MC$  rule it will produce 6 units. Loss per unit or output is \$6.50 (= \$41 - \$47.50). Total loss = \$39 (= 6  $\times$  \$6.50), which is less than its total fixed cost of \$60.

(c) No, because \$32 is always less than AVC. If it did produce, its output would be 4—found by expanding output until MR no longer exceeds MC. By producing 4 units, it would lose \$82 [= 4 (\$32 - \$52.50)]. By not producing, it would lose only its total fixed cost of \$60.

(d) Column (2) data, top to bottom: 0; 0; 5; 6; 7; 8; 9, Column (3) data, top to bottom in dollars: -60; -60; -55; -39; -8; +63; +144.

(e) The firm will not produce if  $P < AVC$ . When  $P > AVC$ , the firm will produce in the short run at the quantity where  $P (= MR)$  is equal to its increasing MC. Therefore, the MC curve above the AVC curve is the firm's short-run supply curve, it shows the quantity of output the firm will supply at each price level. See Figure 7-6 for a graphical illustration.

(f) See table under question (d) above.

(g) Equilibrium price = \$46; equilibrium output = 10,500. Each firm will produce 7 units. Loss per unit = \$1.14, or \$8 per firm. The industry will contract in the long run.

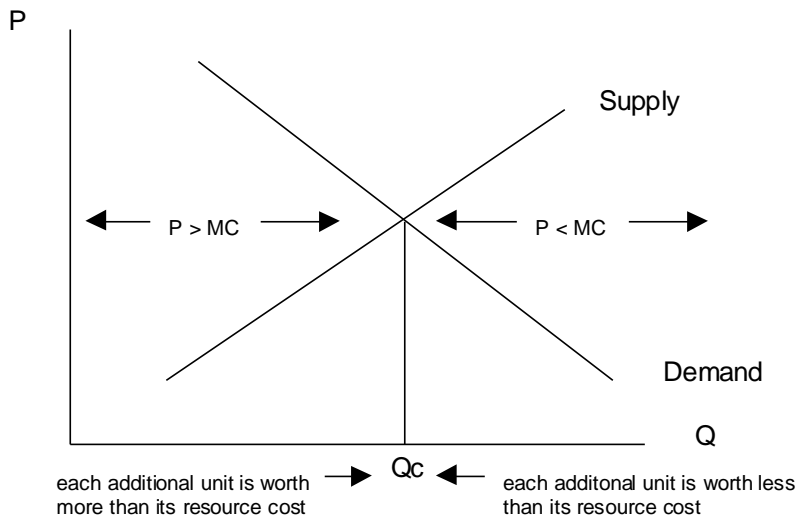
WRITE [5] Why is the equality of marginal revenue and marginal cost essential for profit maximization in all market structures? Explain why price can be substituted for marginal revenue in the  $MR = MC$  rule when an industry is purely competitive.

ANS. To maximize profit, every firm regardless of market structure should produce every unit that adds more to revenue than it does to cost. In this way the firm maximizes net revenue (the positive difference between revenue and cost) also known as profit. Because the perfectly competitive firm can sell all it wants at the market price, price (or average revenue) is equal to marginal revenue. Each unit sold adds exactly its price to the firm's total revenue.

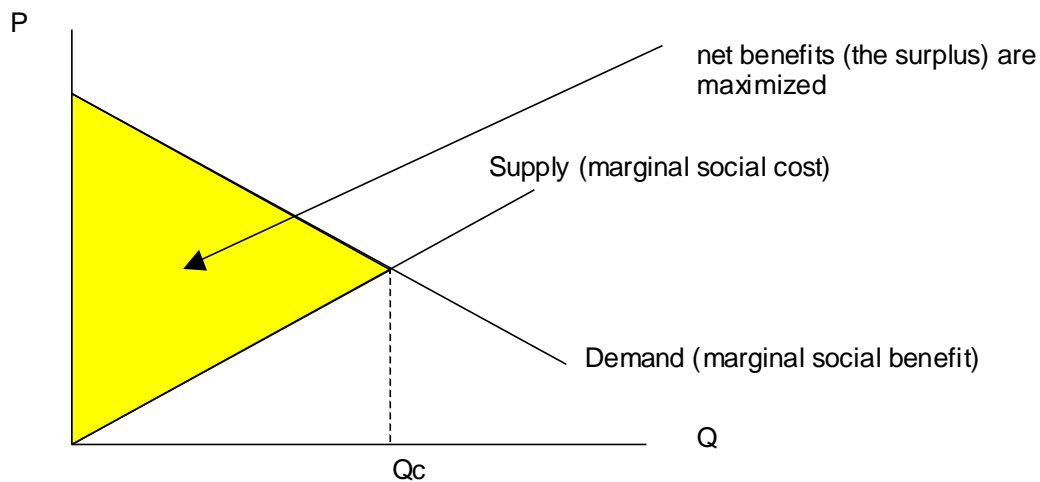
WRITE [7] In long-run equilibrium,  $P = \text{minimum ATC} = MC$ . Of what significance for economic efficiency is the equality of P and minimum ATC? The equality of P and MC? Distinguish between productive efficiency and allocative efficiency in your answer.

ANS: The equality of P and minimum ATC means the firms is achieving productive (also called technical) efficiency; it is using the most efficient technology and employing the least costly combination of resources. The equality of P and MC means the firms is achieving allocative efficiency; the industry is producing the right product in the right amount based on society's valuation of that product and other products.. In commonsense terms, allocative efficiency means producing the correct amount of goods or services. This is one of the fundamental questions that every economy must answer (i.e., "what to produce?"). What to produce means what products, and how much of them. We have chosen the right products and the right quantities when we maximize net social benefits. More technically, allocative efficiency is achieved when  $P = MC$ . This is because each P on the demand curve represents the value of the marginal unit demanded at that price (for example, if society demands 15 units at a price of \$5, then the 15th unit is "worth" \$5 dollars -- remember, the 14th, 13th, 12th, etc. units are worth more because of the law of diminishing marginal utility). Each point on the supply curve represents the marginal cost of the last unit produced (if suppliers will supply 20 units at a price of \$7,

then the marginal cost of the 20th unit is \$7 -- remember the 19th, 18th, 17th etc. units have a lower marginal cost because, in the short run, of the law of diminishing returns to the fixed factor). Thus when  $P = MC$ , we have produced every unit that is more valuable than its cost (i.e., we have maximized net benefits).

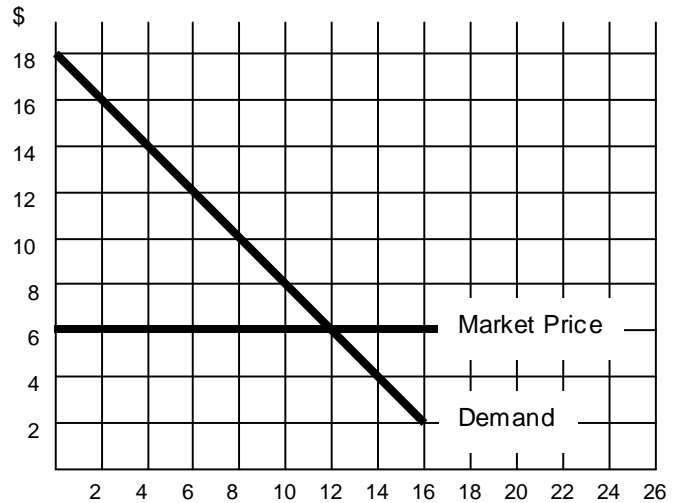


Production at less than  $Q_c$  means that some units that would contribute to net benefits are not being produced. Production beyond  $Q_c$  means that some units that generate negative net benefits (i.e., marginal social cost exceeds marginal social benefit) are being produced, thereby reducing total net benefits.



WRITE: The figure to the right shows Bob's demand for pizzas and the market price.

- What is the value (as opposed to price) of the 10th unit consumed?
- What is the value of the 4th unit consumed?
- What is Bob willing to pay for the 4th unit?
- How much consumer surplus is generated by the 8th unit?
- How many pizzas will Bob purchase at the market price?
- What is the total amount paid for pizzas in question (e)?
- What is the total benefit (value) of pizzas in question (e)?
- What is the consumer surplus in question (e).
- Now assume the restaurant has an "all you can eat" special for \$25. How many pizzas will Bob consume (if any) What will be his consumer surplus (if any)?

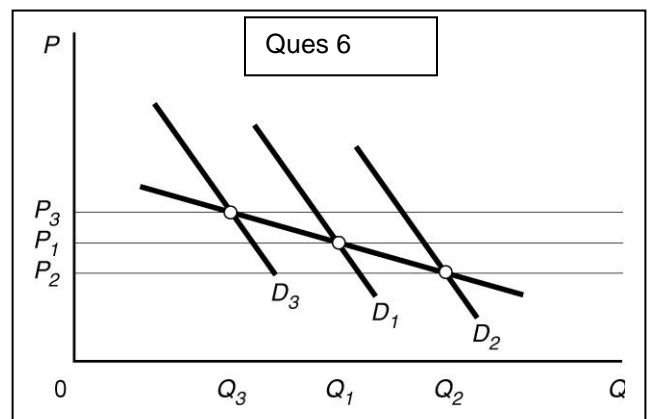


ANS:

- The value of the 10th unit is \$8, which is what Bob is willing to pay for the 10th unit. However, Bob would pay more for all units from 1-9.
- The value of the 4th unit is \$14.
- Bob is willing to pay \$14 for the 4th unit.
- All units cost \$6 per pizza. The 8th unit is worth \$10 to Bob so it generates a consumer surplus of \$4.
- Bob will purchase 12 units at a price of \$6.
- Price times quantity or  $\$6 \times 12 = \$72$ .
- The total value is the area under the demand curve up to 12 units. This is equal to \$144.
- Total value minus total amount paid = \$72.
- If the restaurant has an "all you can eat" deal, there is no price for individual units. Bob should compare the total benefits of consuming all units with a positive utility with the total cost (\$25). So the 1st unit is worth \$17, the 2nd \$16, the 3rd \$15, etc. (the sum is \$153, the cost is \$25, the net benefit is  $\$153 - \$25 = \$128$ ; or you could say the area under the demand curve =  $18 \times 18 / 2 = 162$  which approximates the total utility of consuming 18 units, and then subtract \$25 from this).

CONSIDER [6] Using diagrams for both the industry and representative firm, illustrate competitive long-run equilibrium. Assuming constant costs, employ these diagrams to show how (a) an increase and (b) a decrease in market demand will upset this long-run equilibrium. Trace graphically and describe verbally the adjustment processes by which long-run equilibrium is restored. Now rework your analysis for increasing and decreasing cost industries and compare the three long-run supply curves..

ANS: Figures 7-8 and 7-9 in the textbook show how a shift up and a shift down in demand upset equilibrium, and then how equilibrium is re-established in a constant cost industry. Notice that with a constant cost industry, the new equilibrium price is the same as the old -- only equilibrium quantity changes. Figure 7-11 shows the long-run supply curve for an increasing cost industry. In an increasing cost industry, as more firms enter the industry, everyone's costs go up (perhaps they bid up the cost of a common input, like wages). The supply curve for a decreasing cost industry is shown to the right. In a decreasing cost industry, everyone's costs go down as firms enter the industry (perhaps input suppliers to the industry can reap economies of scale and these cost savings are passed on -- for example, the entry of bicycle manufacturers increases the demand for bicycle tires, bicycle tire



*manufacturers move out their cost curve, exploit economies of scale, and pass these cost savings on to the bicycle manufacturers). There are limits to this of course and eventually, as the universe was filled with the product we would expect costs to rise.*