Name: __Solutions____

Cosumnes River College
Principles of Microeconomics
Problem Set 7
Due April 9, 2015

Spring 2015 Prof. Dowell

Instructions: Write the answers clearly and concisely on these sheets in the spaces provided.

1. Tina does free-lance photography. The following table shows her marginal costs of taking family portrait pictures. The price of getting a family picture taken is $50 (assume that the picture taking industry is characterized by perfect competition). Tina's fixed costs include the camera and lights amounting to $300 (assume she is leasing the equipment).

Number of Portraits	Marginal Cost
0	$0
1	$20
2	$15
3	$20
4	$25
5	$30
6	$35
7	$40
8	$45
9	$50
10	$55
11	$60
12	$65

   a. How many pictures should Tina take to maximize profit?

      As a perfect competitor, Tina takes the market price as given. She will produce where MC=MR or a total of 9 units which sell at $50.00 each.

   b. Calculate Tina's profits. (Hint: you have all the information you need to figure out Tina's total costs.)

      From part a we know that total revenue is 9x$50 = $450. We need to calculate total cost though. To do this, add total cost to the table as shown below.

Number of Portraits	Total Cost	Marginal Cost
0	$300	$0
1	$320	$20
2	$335	$15
3	$355	$20
4	$380	$25
5	$410	$30
6	$445	$35
7	$485	$40
8	$530	$45
9	$580	$50
10	*$635*	$55
11	*$695*	$60
12	*$760*	$65

When quantity is zero, total cost is simply the $300 of fixed costs (given in the problem). For each unit produced, the total cost increases by the marginal cost. For example, the first unit produced adds $20 to costs resulting in a total cost of $320. For 9 units, we see that total cost is $580. This means that profit, which is equal to total revenue minus total costs is $450 - $580 = -$130.

c. Given Tina's profits in part b, should she stay open in the short run? Explain why or why not.

Yes. See will stay in business in the short run. The variable cost is total costs minus fixed costs or $580 - $300 = $180. With 9 units of production this results in AVC = $180/9 = $20. Since this is less than the price, she stays in business. Another way of looking at it is as follows: By staying in business in the short run, Tina loses $130. If she shut down though, she would lose $300. Hence, the best short-run decision is to stay in business.

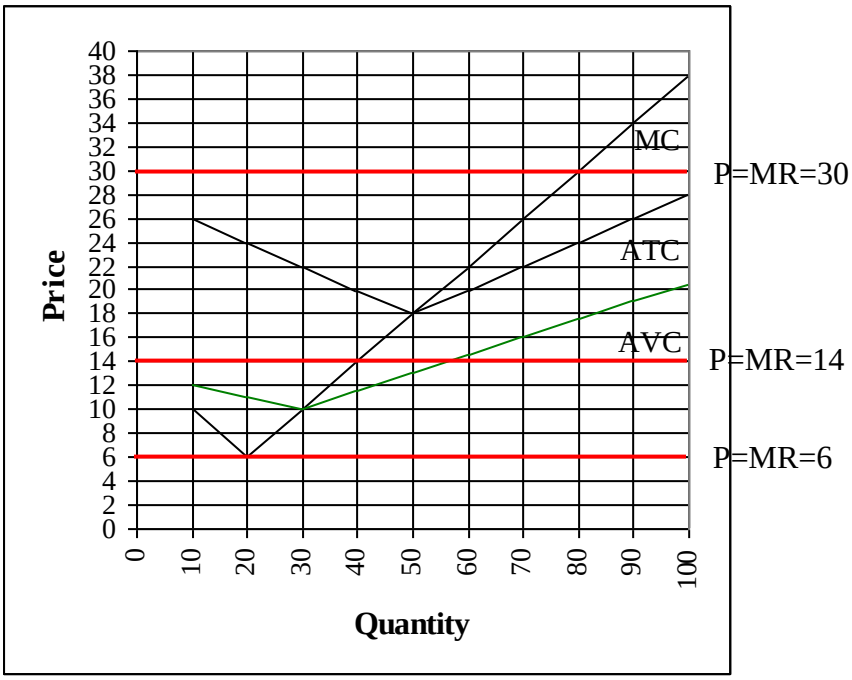
d. Given Tina's profits in part b, should she stay open in the long run? Explain why or why not.

No. She is losing money ($180) and will exit the industry in the long run.

e. Do you have any advice for Tina on how she could increase her profit? For example, should she raise/lower her price? Should she sell more/less than what you originally suggest? Is she doing the best that she can?

By setting MC=MR she is doing the best she can. Any other price/quantity will further increase her loses.

2. The following graph shows the costs for a firm in perfect competition.



a. If the market price for the good is $30, what is the profit-maximizing quantity for the firm to sell? How much are the firm's profits? Will the firm stay in business in the short run? Will the firm stay in business in the long run? Explain.

The profit maximizing (or loss minimizing) quantity is always that quantity (Q) at which MC=MR (marginal cost equals marginal revenue). In the case of perfect competition, MR is equal to price (P), in this case $30.00. From the graph, we see that this happens when the quantity is 80. Also form the graph, the firms average total costs (ATC) are $24.00 and average variable costs (AVC) are approximately $17.50.

Profits are total revenue less total costs where total revenue (TR) is PxQ and total costs (TC) are ATCxQ.

profits = PxQ – ATCxQ = Q(P – ATC) = 80(30 – 24) = 30x6 = 180.

Since there are profits (and P>ATC) the firm will stay in business in both the short and long run.

b. If the market price for the good is $14, what is the profit-maximizing quantity for the firm to sell? How much are the firm's profits? Will the firm stay in business in the short run? Will the firm stay in business in the long run? Explain.

Here MC=MR=P when Q=40. ATC is $20.00 and AVC is approximately $11.00

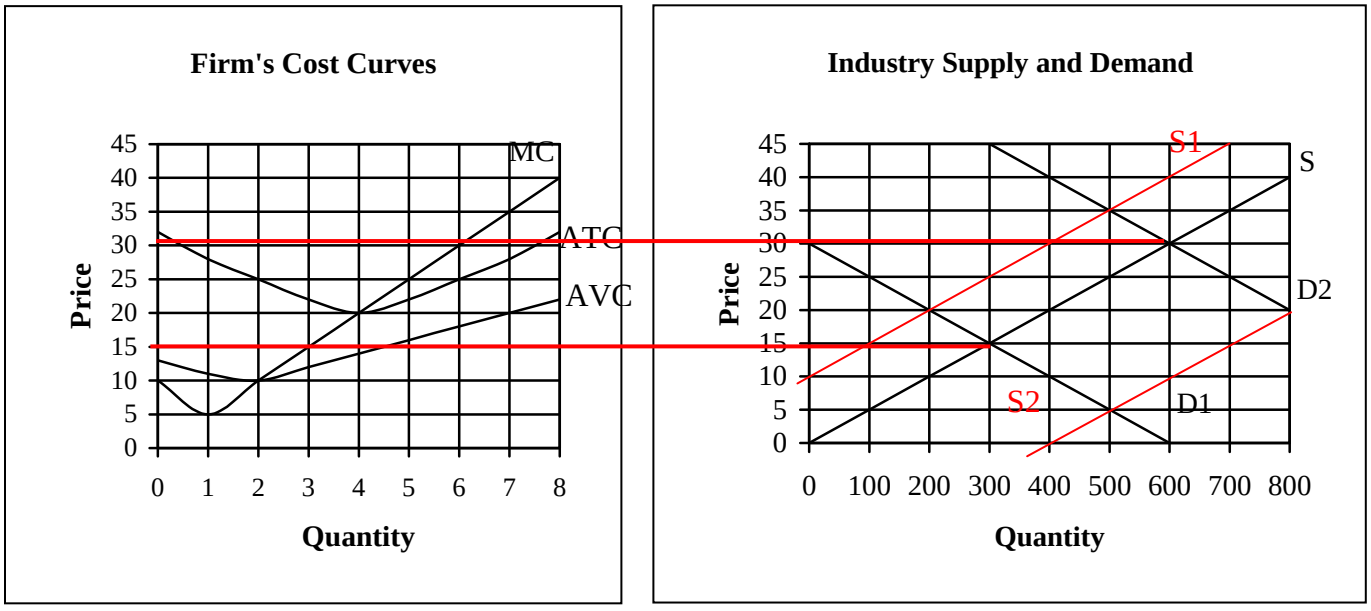
Profits are 40(14 - 20) = 40(-6) = -240, an economic loss. The firm will continue to operate in the short run since P>AVC (14>11). In the long run though, they will shut down due to the losses.

c. If the market price for the good is $6, what is the profit-maximizing quantity for the firm to sell? How much are the firm's profits? Will the firm stay in business in the short run? Will the firm stay in business in the long run? Explain.

Here MC=MR=P when Q=20. ATC is $24.00 and AVC is approximately $13.00

Profits are 20(6 - 24) = 20(-18) = -360, an economic loss. The firm will shut down in the short run since P<AVC (6<13). In the long run they will be shut down as well.

3. The first graph below shows the cost curves for a firm in perfect competition that sells widgets. The second graph shows the industry demand and supply curves.



a. If D1 is the current demand curve, what will the price of widgets be and how many widgets will the firm sell? Will the firm stay in business in the short run? Why?

Given that we are in perfect competition, the firm faces the price determined by the market. For D1 this price is $15. The firm produces where MC=MR=P, or a quantity of 3. The ATC for 3 units is approximately $22. Profits are 3(15-22) = 3(-7) = -21. The AVC for 3 units of production is approximately $12. We have P>AVC (15>12), so the firm will stay in business in the short run.

b. If D1 is the demand curve, what would be the long-run equilibrium price, industry quantity and quantity the firm sells? Explain what happens to move to this long run equilibrium (for example, why does the price change form the price above?)

First, only supply will change here. So, given demand, firms will exit until economic profits are zero, shifting the supply curve to S1. With constant technology (and hence fixed cost curves) firms will exit

until P is equal to the minimum of ATC. This means a price of 20, with each firm producing 4 widgets and the industry producing 200 widgets.

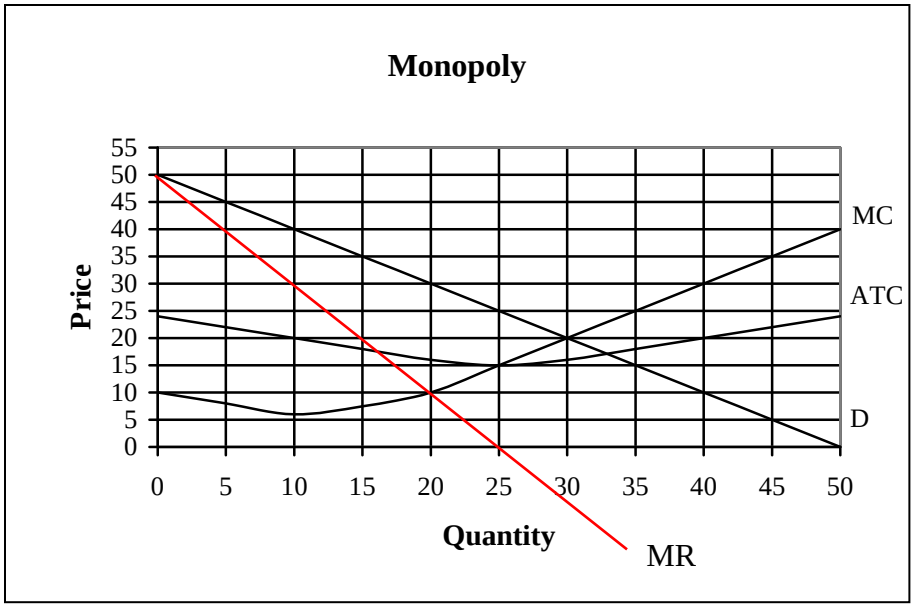
c. If D2 is the current demand curve, what will be the price of widgets, how many widgets will the firm sell and what will the firm's profit be? Will the firm stay in business in the short- run? Why?

For D2 this price is $30. The firm produces where MC=MR=P, or a quantity of 6. The ATC for 6 units is $25. Profits are 6(30-25) = 6(5) = 30. The AVC for 3 units of production is approximately $18. We have P>AVC (30>18), so the firm will stay in business in the short run. Of course, with profits, they will stay in business in the long run as well.

d. If D2 is the demand curve, what would be the long-run equilibrium price, industry quantity and quantity the firm sells? Explain what happens to move to this long run equilibrium.

This is similar to part c, except with economic profits there will be entry until the supply curve shifts to S2 and the price falls to $20 (the minimum of ATC) Each firm will again produce 4 widgets, but the industry will produce 800, at the intersection of D2 and the new supply curve.

4. The following graph shows the costs for a monopoly:



a. If the monopoly maximizes profits, what quantity should it sell and what price should it charge? How do you know?
Set MC=MR => Q=20 and P=$30

b. How much are the profits of the monopoly?
Profits=TR-TC = Q(P-ATC) = 20(30-16)=20x14=$280

c. Is the quantity the monopoly sells the productively efficient quantity? If not, what quantity would be?
No. 25 units of output would lead to productive efficiency because this is at the minimum of Average Total Costs.

d. What will happen to the monopoly in the long run? Why?

Monopoly
Price
Quantity

It will continue to operate and make profits. It has no incentive to shut down, and as a monopolist, there are entry barriers preventing the entry of other firms.

5. Following is a table showing the demand for widgets. There are two types of consumers. The type A consumer must have her widgets, and is willing to pay a high price. The type B consumer likes widgets, but he is unwilling to pay as high a price as the type A consumer.

	Type A Consumer			**Type B Consumer**			**Combined Market**		
P	**Q**	**TR**	**MR**	**Q**	**TR**	**MR**	**Q**	**TR**	**MR**
$11	0	*0*	--	0	*0*	--	*0*	*0*	--
10	10	*100*	*10*	0	*0*	--	*10*	*100*	*10*
9	20	*180*	*8*	0	*0*	--	*20*	*180*	*8*
8	30	*240*	*6*	0	*0*	--	*30*	*240*	*6*
7	40	*280*	*4*	0	*0*	--	*40*	*280*	*4*
6	50	*300*	*2*	5	*30*	*6*	*55*	*330*	*3.33*
5	60	*300*	*0*	10	*50*	*4*	*70*	*350*	*1.33*
4	70	*280*	*-2*	15	*60*	*2*	*85*	*340*	*-0.67*
3	80	*240*	*-4*	20	*60*	*0*	*100*	*300*	*-2.67*
2	90	*180*	*-6*	25	*50*	*-2*	*115*	*230*	*-4.67*
1	100	*100*	*-8*	30	*30*	*-4*	*130*	*130*	*-6.67*
0	110	*0*	*-10*	35	*0*	*-6*	*145*	*0*	*-8.67*

a. Calculate total revenue, and marginal revenue for the type A and B consumers in the table above. (Remember that $MR=\Delta TR/\Delta Q$)

b. Add the quantities demanded by the two consumers to get the market quantity. Calculate total and marginal revenue for the total market.

c. The firm that produces widgets can do so at a constant marginal cost of $4. If they can only sell to the combined market, what quantity will they sell? What price will they sell at? What will their total revenue be?

Set MC=MR in the combined market to get Q=40 and P=$40.
TR=PxQ or $7x40=$280

d. Suppose the firm can separate the market and sell to each consumer at a different price. What quantity will they sell to each type of consumer? What price will they charge to each type of consumer? What will the firms total revenue be?

Set MC=MR in <u>each market.</u>
Type A: Q=40 and P=$7 => TR=$280
Type B: Q=10 and P=$5 => TR=$50

e. Is the total revenue in part d different from that in part c? If yes, why?

Yes. It increases by $50, because by selling to type B consumers at a lower price, the firm is able to sell different units without reducing the price (or quantity) to type A consumers.

f. Which type of consumer has relatively greater price elasticity of demand?

At the price of $5, type B.

6. Answer each of the following True or False and explain.
   a. If a monopoly is earning profits in the short-run, it can continue earning those profits in the long-run.

      True, but only so long as entry barriers are maintained.

   b. In the long-run, if a monopoly is earning a profit, new firms will enter and the firm's demand curve will shift in.

      False. Not so long as there are effective entry barriers.

   c. Regulated natural monopolies are usually forced to charge a price equal to marginal cost.

      False. In natural monopolies MC lies below ATC (because ATC is falling over a wide range of outputs) meaning that MC pricing would force the monopolist to incur loses. It is more common to set P=ATC.

   d. If a firm has negative profits (losses) but has total revenue greater than their fixed costs, then they should stay in business in the short-run.

      False. If they have total revenue greater than total variable costs they should stay in business in the short run.

   e. A firm's profits are equal to (Price-Average Variable Costs)*Quantity.

      *False. A firms profits are equal to (Price – Average Total Costs)*Quantity.*

   f. A firm in perfect competition will be able to earn bigger profits if they sell the product for a price lower than market price.

      False. The would be selling at a point where MC>MR, reducing profits.

   g. The reason price must equal average total cost in long-run equilibrium for perfect competition is if price is not equal to average total cost there is an incentive for new firms to enter the industry or for firms to exit the industry.

      True. If P<ATC there will be losses and firms will exit until P=ATC. If P>ATC there will be profits and firms will enter until P=ATC.