Name: _____Solutions____

Cosumnes River College
Principles of Microeconomics
Problem Set 6
Due Tuesday, March 24, 2015

Spring 2015   Prof. Dowell

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

1. State whether the following decision is a short-run or long-run decision:
    a. ADM is deciding whether to install machinery that uses Human Machine Interface technology
        or 8-layer PCB prototype technology in its manufacturing plant.
        Long-run

    b. Wal-Mart hires additional seasonal workers during November and December.
        Short-run

    c. Bassett furniture manufacturers close all manufacturing plants in North Carolina, USA and
        outsource their furniture production to manufacturing plants in China.
        Long-run

    d. General Motors purchases new equipment to replace depreciating equipment.
        Short-run

2. Sally is considering opening a beauty salon. She anticipates the following annual costs:

Sally's Annual Costs	
Furniture:	$20,000
Equipment:	$14,000
Rent:	$12,000
Coloring products:	$6,000
Styling products:	$4,000

Additionally, Sally is withdrawing $34,000 from her savings account that pays 4% interest per year to purchase the furniture and equipment; she will quit her current job that pays $25,000 per year. She expects total revenues from the new business in the first year to be $70,000. Assume all costs are recognized during the first year. Calculate the following:

    a. Explicit costs (list the items).
        $56,000: furniture, equipment, rent, coloring and styling products

    b. Implicit costs (list the items).
        $26,360: lost income ($25,000) and lost interest (0.04 × $34,000 = $1,360)

    c. Accounting profit.
        Accounting profit is $14,000 ($70,000 - $56,000)

    d. Economic profit.
        Economic profit is –$12,360 ($70,000 - $56,000 - $26,360)

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e. Given this first-year information only, should Sally open a salon?
   Economic profit is negative, so Sally should not open the salon.

3. Use the table below to answer the following questions:

Labor Per day	Number of shoes produced per day
1	5
2	12
3	21
4	29
5	35
6	39
7	39
8	35

a. What is the marginal product of the third worker?
   21-12 = 9 shoes

b. At what level of labor per day does diminishing marginal productivity set in?
   Diminishing marginal productivity sets in with the fourth unit of labor whose MP is only 8 shoes.

c. In what range (of labor per day) will this firm operate?
   Somewhere between 4 and 6 units, the range of diminishing, but still positive marginal productivity.

4. Use the table below to answer the following questions:

Output	Total Cost
0	$10
1	$20
2	$28
3	$38
4	$53
5	$73
6	$99

a. What are variable costs of producing 5 units?
   $63

b. What is average total cost of producing 3 units?
   $38/3 = $12.67

c. What is average fixed cost of producing 4 units?
   $10/4 = $2.50

d. What is the marginal cost of producing the 2nd unit?
   $8

e. What are fixed costs?
   $10

f. What is average variable cost of producing 1 unit?
   $10/1 = $10

5. The table below shows the costs for a firm. Fill in the remaining costs.

Quantity	Fixed Costs	Variable Costs	Total Costs	Marginal Costs	Average Fixed	Average Variable	Average Total
0	500	0	*500*	--	--	--	--
1	*500*	*100*	600	*100*	*500*	*100*	*600*
2	*500*	180	680	80	*250*	*90*	*340*
3	*500*	280	780	*100*	*166.67*	*93.33*	*260*
4	*500*	400	900	*120*	*120*	*100*	225
5	*500*	540	1040	*140*	*100*	108	*208*
6	*500*	700	*1200*	160	*83.33*	*116.67*	*200*
7	*500*	880	1380	*180*	*71.43*	*125.71*	*197.17*

6. The table below shows the costs for a firm. Fill in the remaining costs.

Quantity	Fixed Costs	Variable Costs	Total Costs	Marginal Costs	Average Total Costs
0	*30*	0	*30*	--	
1	*30*	20	50	20	*50*
2	*30*	27	67	*17*	*33.5*
3	*30*	57	87	20	29
4	*30*	80	*110*	23	*27.5*
5	*30*	106	136	26	*27.2*
6	*30*	135	165	29	27.50
7	*30*	167	197	32	*28.14*

7. If marginal productivity is below average productivity, what will happen to average variable cost as output rises? Why?
Average variable cost will rise. That is because if marginal productivity is below average productivity, marginal cost is above average variable costs. And when marginal cost exceeds average variable costs, average variable costs are rising.

8. Explain <u>in your own words</u> why the marginal cost curve is shaped the way it is (at first it decreases then it increases).
The marginal cost curve first slopes downward due to increasing returns. This corresponds to the upward sloping portion of the marginal product curve. The marginal cost curve then slopes upward due to decreasing returns. This portion of the curve corresponds to the downward sloping portion of the marginal product curve.

9. When a firm produces 100 units of a good, their average total cost is $3. When the firm produces 101 units of the good, their average total cost is $3.25. What can you say about the marginal cost of producing the 101st unit? Explain how you know this. Find the marginal cost of producing the 101st unit.
The marginal cost of the 101st unit must be greater than $3.25 in order to "pull" the average up. To calculate it precisely calculate the change in total cost. This is calculated as PxATC. For 100 units we have 100x$3.00 = $300 and for 101 units we have 101x$3.25 = $328.25. Marginal cost is $328.25-$300 = $28.25, a value considerably larger than $3.25

10. State whether the following describes <u>MC</u> (marginal cost), <u>ATC</u> (average total cost), <u>AVC</u> (average variable cost), or <u>AFC</u> (average fixed cost). Some statements may describe more than one cost curve.

    a. Costs continuously decline as output rises.
    > *AFC*

    b. Always lies above the AVC curve.
    > *ATC*

    c. First declines as quantity increases, but then increases as quantity increases.
    > *AVC, ATC and MC*

    d. Cuts the ATC and AVC at their minimum points.
    > *MC*

11. At its current short-run level of production, a firm's average variable costs equal $20 per unit and its average fixed costs equal $30 per unit. Its total costs at this production level equal $2,500.

    a. What is the firm's current output level?

       ATC = TC/Q => $50 = $2,500/Q => Q = 50

    b. What are its total variable costs at this output level?

       TVC = $20 x 50 = $1,000

    c. What are its total fixed costs?

       TFC = $30 x 50 = $1,500

12. Lauren owns a bakery. If Lauren expands the size of her bakery but her average total cost of producing bread remains unchanged in the long run, what is she experiencing?

She is experiencing constant returns to scale, which occur when an increase in the scale of production has no effect on the long-run average total cost of producing output. If her long-run average total cost had decreased, she would be experiencing economies of scale. Alternately, if her long-run average total cost had increased, she would be experiencing diseconomies of scale.

13. Explain the difference between an implicit cost and an explicit cost, and how both costs relate to economic and accounting profits.

An implicit cost is the opportunity cost of some factor of production, such as the next-best alternative use of the business owner's time. An explicit cost is an out-of-pocket expense paid for a factor of production, such as the salary paid to a business owner. Both costs are measured in dollars. Economists include both implicit costs and explicit costs when computing economic profit. Only explicit costs are considered when computing accounting profit.