14.01, Fall 2007
Problem Set 5
Due October 19, 2007

1. Please write your name, the name of your TA, and your section/recitation time (e.g. MWF 10am, or F 1 pm) on top of your solutions.
2. Problem sets are due IN SECTION/RECITATION. Late Problem sets will not be accepted under any circumstances.

Questions

1. Are the following true, false or uncertain? Explain why.

   - a) If there are no fixed costs and the marginal costs are strictly increasing, then the average cost curve is always bellow the marginal cost curve. (6 points)

   - b) If a firm's expansion path is a straight line starting on the origini, that implies that we have constant returns to scale (Hint – think of the Cobb-Douglas production function). (7 points)

   - c) Theresa bought a store in 2001 for 600,000$. In 2002, she decided to open a business in that store, which brought her 100,000$ per year, in the last 5 years. The business has to be closed now due to a fire. Was having that business open a sensible choice by Theresa? (7 points)

2. In Liz's tomato plantation, tomatoes can be picked just using labor or using a combination of labor and tractors. The more tractors are used, the fewer workers can be given up per tractor, in order to catch the same amount of tomatoes. Draw a representative isoquant for Liz's plantation. (10 points)

3. Peter's movie theater is always completely sold out on Friday and Saturday, but only half its capacity is filled on the other days of the week. The theater has 100 seats and the operational costs of having the theater open and running amount to 200 dollars per session. What is the average cost per person on Friday/Saturday and on the other weekdays? How would you advice Peter on what kind of movie goers he should try to attract, Friday/Saturday night ones or weekday night ones? (10 points)

4. Jen owns a factory of automobiles. Due to an increase in the interest rate, the rental cost of the capital she employs went up. Show graphically, the effect of this change on the expansion path of Jen's firm. (10 points)

5. Fill the gaps on the table bellow. (15 points)

q	Total Cost	Variable Cost	Fixed Cost	Average Total Cost	Average Fixed Cost	Average Variable Cost	Marginal Cost
5						6	10
6	85						
7				15			
8					5		25
9		120					

6. Debbie's firm faces the following production function:

$$q = K^{0.5}(L-1)^{0.5}$$

a) On the short run, capital cannot be changed and is equal to 25. What will be the cost of producing 25 units, if the rental cost of capital is 20 and the wage is 5? (2 points)
b) Get the expression for total cost, variable cost, marginal cost, average total cost and average variable cost. (6 points)
c) Graph total cost, variable cost and fixed cost in one graph. Graph marginal cost average cost, average total cost and average variable cost in another graph. (4 points)
d) At what quantity is the average total cost minimized? (4 points)
e) What can Debbie do when we get to the long run? (2 points)
f) What is the MRTS, as a function of K and L? (3 points)
g) Find the long run cost function. (10 points)
h) Draw the firm's expansion path. (4 points)