

## Homework #7

Problems 1, 2 and 3 from Ch. 8, p. 203-04  
of Krugman/Wells *Microeconomics* (1st ed.)

1. Marty's Frozen Yogurt is a small shop that sells cups of frozen yogurt in a university town. Marty owns three frozen-yogurt machines. His other inputs are refrigerators, frozen-yogurt mix, cups sprinkle toppings, and, of course, workers. He estimates that his daily production function when he varies the number of workers employed (and at the same time, of course, yogurt mix, cups and so on) is as shown in the accompanying table.

qty. of labor in workers	cups of frozen yogurt	marginal product of labor	fixed cost		variable cost (from labor)		variable cost (from other inputs)		total cost		marginal cost
			total	avg.	total	avg.	total	avg.	total	avg.	
0	0	---	\$100	---		---		---		---	---
1	110		\$100		\$80		\$0.50				
2	200		\$100				\$0.50				
3	270		\$100				\$0.50				
4	300		\$100				\$0.50				
5	320		\$100				\$0.50				
6	330		\$100				\$0.50				

- a. What are the fixed inputs and variable inputs in the production of cups of frozen yogurt?
  - b. Draw the total product curve. Put the quantity of labor on the horizontal axis and the quantity of frozen yogurt on the vertical axis.
  - c. What is the marginal product of the first worker? The second worker? The third worker? Why does marginal product decline as the number of workers increases?
2. The production function for Marty's Frozen Yogurt is given in Problem 1. Marty pays each of his workers \$80 per day. The cost of his other variable inputs is \$0.50 per cup of frozen yogurt. His fixed cost is \$100 per day.
- a. What is Marty's variable cost and total cost when he produces 110 cups of yogurt? Calculate variable and total cost for every level of output given in Problem 1.
  - b. Draw Marty's variable cost curve. On the same diagram draw his total cost curve.
  - c. What is the marginal cost per cup for the first 110 cups of yogurt? For the next 90 cups? Calculate the marginal cost for all remaining levels of output. HINT: Calculate marginal cost by dividing the change in total cost by the change in output of yogurt.
3. The production function for Marty's frozen yogurt is given in Problem 1. The costs are given in Problem 2.
- a. For each of the given levels of output, calculate the average fixed cost (AFC), average variable cost (AVC), and average total cost (ATC) per cup of frozen yogurt.
  - b. On one diagram, draw the AFC, AVC, and ATC curves.
  - c. What principle explains why the AFC declines as output increases? What principle explains why the AVC increases as output increases? Explain your answers.
  - d. How many cups of frozen yogurt are produced when average total cost is minimized?

**DO THIS TOO!** Draw the marginal cost (MC) curve on the same diagram that you drew the AFC, AVC, and ATC curves. What do you notice about the point where the MC curve intersects the ATC curve? (Keep in mind that our calculation of marginal cost is an approximation).