

Homework Assignment #5

15 points

Due Date: Beginning of Class on **Tuesday, April 15, 2014**

**Instructions:** Make sure your answers are precise, complete and legible, with plenty of explanation for why you did what you did. If I can't read your answer, you won't get credit for it. Don't forget to label all items on graphs. Show all your work or points may be taken off.

1. (6 points) Suppose the annual production of yellow corn is  $q = L^{0.19}K^{0.81}$ , where  $q$  is hundreds of bushels,  $K$ =work years of machine service and  $L$ =work years of labor. Assume that  $K$  is fixed at 25 units.

- Using integer values of  $L$  between 0 and 10, find and graph the total product, marginal product of labor, and average product of labor curves. Graph the marginal and average products on the same graph.
- Is this a short-run or long-run problem? Briefly explain why.
- When are  $MP_L$  and  $AP_L$  equal? Why are they equal at that point? (i.e., explain the relationship between the  $MP_L$  and  $AP_L$  curves).
- Assume now that  $K$  is allowed to vary. What is the marginal rate of technical substitution (MRTS) for this production function when Labor is on the x-axis and Capital is on the y-axis? Interpret the MRTS with at least 2 sentences.

2. (5 points) The table below depicts a short-run production function for Albert's Pretzels.

Labor	Output
1	10
2	18
3	24
4	28
5	30

- Calculate the marginal product of labor ( $MP_L$ ) for each row of the above table.
- Calculate the average product of labor ( $AP_L$ ) for each row of the above table.
- Based on your calculations, at what amount of labor does the law of diminishing marginal productivity **first** appear?
- Using at least 3 sentences, explain the law of diminishing marginal productivity.

**MORE ON THE BACK...**

True/False section. Please answer “True” or “False” and explain why. All credit is given based on the explanation. Minimum of 2 sentences required for the explanation. Graphs/figures can also be used in the explanation.

3. (2 points) Unlike indifference curves, isoquants can intersect.

4. (2 points) Let the production function be  $q = AL^\alpha K^\beta$ . The function exhibits increasing returns to scale if  $a + b < 1$ .