

FE341: Microeconomics
Homework 3
Due October 11th

1. Suppose that you own a lawn-mowing business. You currently have 5 lawnmowers. The total number of lawns mowed per month is given by the function

$$q = \sqrt{2000KL} .$$

where L is the labor input per month, and K is the capital (lawnmowers) input per month.

- a. Indicate what the short-run production function is.
- b. Graph the relationship between q and L in the short-run.
- c. What is the average productivity of labor? Graph this relationship and show that output per unit of labor input diminishes for increases in labor input.
- d. What is the marginal product of labor?
- e. Graph this relationship and show that labor's marginal productivity is less than average productivity for all values of L .

2. Suppose that output of sweaters is characterized by $q = 10K^{1/2}L^{1/2}$, where L denotes the number of worker hours employed and K denotes the number of sewing machines employed.

- a. Graph the isoquant for $q = 1000$ sweaters.
- b. Calculate the marginal rate of technical substitution (note: it will be in terms of K and L).
- c. What is the approximate value for the *marginal rate of technical substitution* $MTRS_{LK}$ at $K = 100, L = 100$?
- d. If technical progress shifted the production function to $q = 40K^{1/3}L^{2/3}$ would the various values of the MRTS be changed as a result of this technical progress?

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