

EconS 301
Written Assignment #5

Due date: October 18th, 2016.

Exercise #1. Consider a firm with the following Cobb-Douglas product function for labor and capital

$$q = L^{1/2}K^{1/2}$$

- a) Consider an output level of $q = 100$. Find the expression of the isoquant for this output level. [*Hint*: Solve for capital, K .]
- b) Find the marginal product of labor, MP_L . Is it increasing, decreasing, or constant in the units of labor, L , that the firm uses?
- c) Find the marginal product of capital, MP_K . Is it increasing, decreasing, or constant in the units of capital, K , that the firm uses?
- d) Use your result in parts (b)-(c) to find the marginal rate of technical substitution, $MRTS$, for this firm.
- e) Is the $MRTS$ increasing or decreasing in the units of labor, L ? What does that imply about the shape of the isoquant?
- f) Given your result in part (d), what can you say about the firm's ability to substitute one input for another?
- g) Assume now that the firm were to increase all inputs by a common factor $\lambda > 0$. What happens to the output that the firm produces? [This question asks you to check if the firm's production function exhibits increasing, decreasing, or constant returns to scale.]

Exercise #2. Repeat your analysis of Exercise #1 for the following linear production function

$$q = 3L + 5K$$