

ECO 201
Problem Set 4

1. The short run production function is $Y = 24L^2 - 2L^3$. Draw the MP (L) and the AP (L) functions. Does the production function depict Law of Variable Proportion?
2. Consider the production function $Y = A\bar{K}L^\alpha$, $\alpha > 0$ and A, K are constants. Does this production function exhibit Law of Variable Proportion?
3. Suppose the short run cost function is $STC(Y) = 2Y^3 - 16Y^2 + 50Y + 100$. Obtain the SMC (Y), AVC (Y) and SAC (Y) functions.
4. Suppose MRTS between L and K is -4 . The producer wishes to produce the same amount of output with 3 units less of L. How much more K is required?
5. In a production process is it possible to have diminishing marginal product in an input and yet IRS?
6. Consider the following production function: $Y = L^\alpha K^\beta$, $\alpha, \beta > 0$.
 - (a) What is the output elasticity of each factor?
 - (b) Obtain the conditional factor demand functions.
 - (c) Obtain the cost function.
 - (d) Obtain the expansion path.
7. A firm has a production function $Y = LK$. If the minimal cost of production at $w = r = 1$ is equal to 4, what is Y equal to?
8. Consider the following production function: $Y = L + K$.
 - (a) Obtain the conditional factor demand functions.
 - (b) Obtain the cost function.
9. A firm has 2 plants. The cost functions are $C_1(Y_1) = Y_1^2$ and $C_2(Y_2) = Y_2^2$. What is the cost function of the firm? (Ignore factor prices in your derivation.)
10. If the production function is $Y = \min\left(\frac{L}{a}, \frac{K}{b}\right)$, $a \text{ \& } b > 0$. What will be the minimal cost of producing Y units of output?

11. The cost function is $C = \min(w, r)Y$. What is the production function? What are the conditional factor demand functions?
12. The cost function is $C = Y(w + r)$. What are the conditional factor demand functions? What is the production function?
13. The cost function is $C = w^\alpha r^\beta Y$. What do we know about α and β ?
14. Suppose a family of short run total cost functions is given by

$$STC(Y) = 0.5Y^3 - 8Y^2 + (60 - 2K)^2 + K^2.$$

Obtain the long run total cost function? Draw the long run marginal cost function? What will be the long run capacity output of the firm?