Sample Exam Problems Related to Chapter 4
(Source: Fall 2008 Midterm Exam, ECO 5315)

1. A production function is a table, a graph, or an equation showing the

   A. least-cost method of producing output.
   B. optimal combination of inputs.
   C. <u>maximum output that can be achieved from specified levels of inputs.</u>
   D. combinations of inputs that can be produced with equal costs.
   E. optimal production technology that a firm should employ.

2. When average product is at a maximum, marginal product is

   A. zero.
   B. increasing.
   C. <u>equal to average product.</u>
   D. greater than average product.
   E. less than average product.

   <u>Note:</u> See Figure 4.2, p. 100, which illustrates that when average product is at a maximum, marginal product is equal to average product. The math proof for this is given on page 101 in the quant option box.

3. The law of diminishing marginal returns states that

   A. the marginal product of labor declines as all inputs are increased.
   B. production functions exhibit decreasing returns to scale.
   C. the marginal product of labor returns as more capital is used.
   D. <u>the marginal product of a factor eventually diminishes as more of the input is used, holding other inputs fixed.</u>
   E. the marginal product of a factor always diminishes as more of the input is used, holding other inputs fixed.

4. If output is produced according to $Q = (KL)^{3/4}$, then this production process exhibits

   A. <u>increasing returns to scale.</u>
   B. decreasing returns to scale.
   C. first increasing and then decreasing returns to scale.
   D. constant returns to scale.

   <u>Note:</u> Since the exponents for K and L sum to 1.5, this means that there are increasing returns to scale; doubling the K and L inputs will cause Q to more than double!

5. An isoquant represents combinations of inputs that

   A. <u>produce the same level of output.</u>
   B. produce increasing amounts of output.
   C. minimize costs.
   D. maximize output.
   E. create wealth.

6. The marginal rate of technical substitution between two inputs

   A. shows the rate at which one input can be traded for another, holding output constant.
   B. shows the efficient combination of inputs.
   C. increases as we move down an isoquant.
   D. shows the rate at which output can be increased by using more of both inputs.
   E. shows the rate at which output decreases when using less of one of the inputs.

7. Lines that represent bundles of inputs that cost the same total amount are called

   A. total cost curves.
   B. isocost curves.
   C. cost curves.
   D. isoquants.
   E. isoprofit curves.

8. If output is produced according to $Q = 3K + 4L$, then this production process exhibits

   A. increasing returns to scale.
   B. decreasing returns to scale.
   C. first increasing and then decreasing returns to scale.
   D. constant returns to scale.
   E. first decreasing and then increasing returns to scale.

   Solution: If $K = L = 1$, then $Q = 7$. If we double the number of labor and capital inputs; i.e., if $K = L = 2$, then $Q = 14$. Therefore this production process exhibits constant returns to scale.

9. If output is produced according to $Q = 4LK$ (L is the quantity of labor input and K is the quantity of capital input), the price of K is \$10, and the price of L is \$5, then the cost minimizing combination of K and L capable of producing 32 units of output is

   A. $L = 8$ and $K = 1$.
   B. $L = 4$ and $K = 2$.
   C. $L = 2$ and $K = 2$.
   D. $L = 2$ and $K = 4$.
   E. $L = 1$ and $K = 8$.

   Solution: The cost minimizing combination of K and L capable of producing 32 units of output is found by equating the marginal products per dollar spent of labor and capital; i.e., $MP_L / P_L = 4K/5 = 4L/10 = MP_K / P_K \Rightarrow 2K = L \Rightarrow Q = 4(2K \times K) = 32 \Rightarrow K = 2$; $\therefore Q = 4(L \times 2) = 32 \Rightarrow L = 4$.