ECON2103 Microeconomics

Chapter 6 Exercises

1. Fill in the gaps in the table below.

Quantity of Variable Input	Total Output	Marginal Product of Variable Input	Average Product of Variable Input
0	0	—	—
1	225		
2			300
3		300	
4	1140		
5		225	
6			225

2. For each of the following examples, draw a representative isoquant. What can you say about the marginal rate of technical substitution in each case?

   a. A firm can hire only full-time employees to produce its output, or it can hire some combination of full-time and part-time employees. For each full-time worker let go, the firm must hire an increasing number of temporary employees to maintain the same level of output.

   b. A firm finds that it can always trade two units of labor for one unit of capital and still keep output constant.

   c. A firm requires exactly two full-time workers to operate each piece of machinery in the factory.

3. Do the following functions exhibit increasing, constant, or decreasing returns to scale? What happens to the marginal product of each individual factor as that factor is increased and the other factor held constant?

   a. $q = 3L + 2K$

   b. $q = (2L + 2K)^{\frac{1}{2}}$

   c. $q = 3LK^2$

d. $q = L^{\frac{1}{2}} K^{\frac{1}{2}}$

e. $q = 4L^{\frac{1}{2}} + 4K$

4. The production function for the personal computers of DISK, Inc., is given by $q = 10K^{0.5}L^{0.5}$, where q is the number of computers produced per day, K is hours of machine time, and L is hours of labor input. DISK's competitor, FLOPPY, Inc., is using the production function $q = 10K^{0.6}L^{0.4}$.
   a. If both companies use the same amounts of capital and labor, which will generate more output?
   b. Assume that capital is limited to 9 machine hours, but labor is unlimited in supply. In which company is the marginal product of labor greater? Explain.