**Homework Exercise Numbers 1**

1. A firm estimates its cubic production function of the following form: *Q* = *AL*3 + *BL*2 and obtains the following results:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DEPENDENT VARIABLE | Q | R−SQUARE | F−RATIO | P−VALUE ON F |  |
| OBSERVATIONS: | 32 | 0.7547  | 92.31 |   0.0001 |  |
| VARIABLE |  | **PARAMETER****ESTIMATE** | **STANDARD****ERROR** | **T−RATIO** | **P−VALUE** |
| L3 |  | −0.0016 | 0.0005 | −3.20 | 0.0032 |
| L2 |  | 0.4000 | 0.0950 | 4.21 | 0.0002 |

**a.** The equations for total product, average product, and marginal product are:

*TP* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*AP* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

*MP* = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**b.** The estimated values of *A* and *B* are statistically significant at the (exact) levels, \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_, respectively.

**c.** At \_\_\_\_\_\_\_ units of labor usage, marginal product of labor begins to diminish.

When the wage rate is $300, answer the following questions. (Remember that *AP* =

*Q*/*L*; *AVC* = *w*/*AP*; and *SMC* = *w*/*MP*.)

**d.** Average product of labor reaches its maximum value at \_\_\_\_\_\_\_\_ units of labor.

**e.** At the output for part *d*, average variable cost is $\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and marginal cost is $\_\_\_\_\_\_\_\_\_\_\_\_.

**f.** When the rate of labor usage is 100 units of labor, output is \_\_\_\_\_\_\_ units.

Average variable cost is $\_\_\_\_\_\_\_\_\_ and marginal cost is $\_\_\_\_\_\_\_\_\_\_.