

### Production and Costs

1. A factory produce a good using 2 machines with labor according to the following table:

Labor	5	9	11	12	18	25
Output	2	4	8	12	18	20

If the rental rate for capital is 200 Baht per machine per day and the wage rate is 100 Baht per worker per day,

- (a) Calculate the average product (AP) and marginal product (MP).
  - (b) Calculate the total variable cost (TVC), total cost (TC), average variable cost (AVC), average fixed cost (AFC), average cost (AC), and marginal cost (MC).
  - (c) Draw the graph of TP curve on the left and draw the graphs of TVC and TC curves on the right.
  - (d) Draw the graph of AP and MP curves on the left. Then draw the graphs of AVC, AFC, AC, and MC curves on the right.
2. Consider a production function,  $Q = 2K^{1/2}L^{1/2}$  where q is output level, K is capital, and L is labor.
- (a) What kind of returns to scale this production function has? Why?
  - (b) Can the firm experience any economies or diseconomies of scale? Why ?
  - (c) Calculate the MRTS in the form of K and L.
  - (d) What are the values of MRTS when  $K = 25 = L$ , and  $K = 50 = L$ .
- Suppose the wage rate is 4, the capital rental rate is 1, and the capital is fixed at 100 unit. Use the information to answer part (e) and (f)
- (e) From the production function, rewrite L in terms of K and Q.
  - (f) Calculate the short run TC, AC, AFC, AVC, and MC in terms of Q.
3. A CD-ROM factory uses two input: labor (L) and plastic injector machine (K). The factory pays 100 Baht/day and 500 Baht/day. The production is as the following table:

Output/ day	K	L
1,000	5	100
2,000	10	180
4,000	18	300
6,000	25	460
8,000	40	720
10,000	60	1,500

- (a) Calculate the long run total cost (LTC), long run average cost (LAC), and long run marginal cost (LMC).
- (b) Plot those curves.
- (c) At which output level that it starts to experience decreasing returns to scale.