Exercise Set 11
MARGINAL PRODUCT OF LABOR

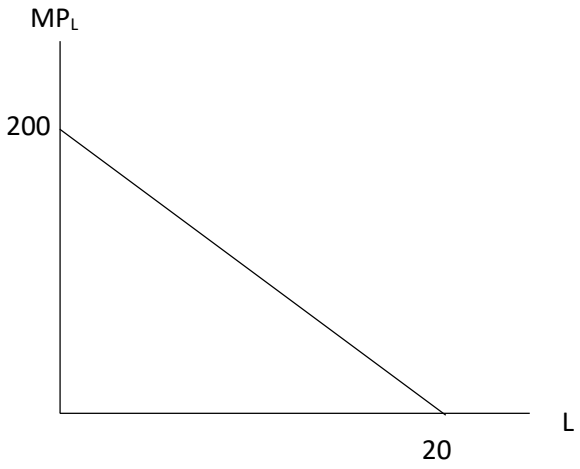
III. Questions

1. Select values for the parameters: **a = 200, b = 5**.

2. Obtain the MP_L function.

   $MP_L = 200 - 10L$

3. Sketch the MP_L function with L on the horizontal axis.



4. Does the production function exhibit the Law of Diminishing Marginal Productivity? Explain.

   Yes. As the firm uses more labor (L increases), the marginal product of labor falls, *ceteris paribus.*

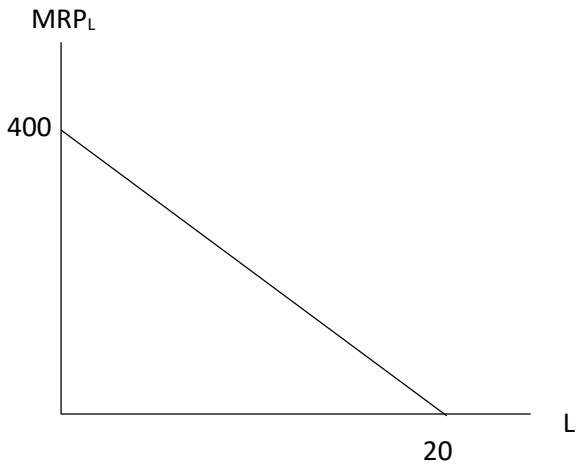
5. Select values for the wage rate and the price of output: **W = 60, P = 2**.

a. Obtain, and sketch, the MRP_L function.

$$MRP_L = P \times MP_L$$

$$= 2(200 - 10L)$$

$$= 400 - 20L$$



b. Determine the optimal quantity of labor demanded by the firm (L*).

At the optimal point:

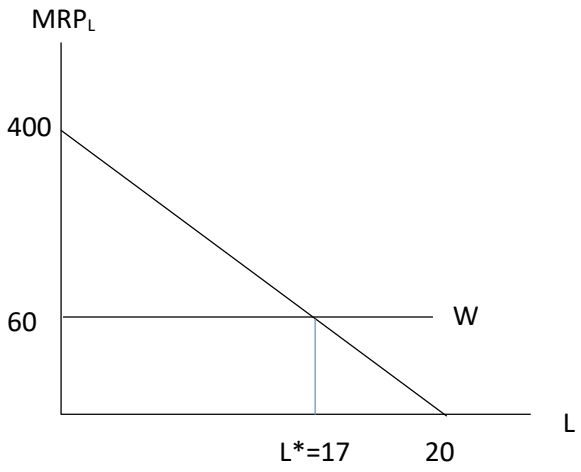
$$MRP_L = W$$

$$400 - 20L = 60$$

$$20L = 340$$

$$L^* = 17$$

Graphical solution for L*:



6. What is the change, if any, in MP_L, MRP_L and L* as a result of:

   a. An increase in the wage rate?

      No change in MP_L.

      No change in MRP_L.

      L* will decrease. (Look at figure in Q.5. The wage line shifts up.)

   b. A decrease in the price of output?

      No change in MP_L.

      MRP_L curve will shift down.

      L* will decrease.

c. An increase in *a*? [What does an increase in a mean? Look at the production function.]

An increase in *a* implies that the firm can produce more output with the same number of workers. This can be interpreted as an increase in labor productivity.

MP_L curve will shift up.
MRP_L curve will shift up.

L* will increase.

7. If the wage rate decreases, *ceteris paribus*, the firm will find it optimal to hire [more / fewer] workers. Explain.

More workers. At a lower wage, the marginal revenue product of the last worker hired will be correspondingly lower. This means that L* will be greater.

8. If the price of output rises, *ceteris paribus*, the firm will find it optimal to hire [more / fewer] workers. Explain.

More workers. The marginal revenue product of each worker is higher than before. This means that L* will be greater.