

15

DEMAND FOR INPUTS

OVERVIEW

1. Each firm is involved in two markets, a market for its output and a market for inputs. Decisions the firm makes in one market affect its decisions in the other market.
2. The marginal revenue product is the change in total revenue due to a change in the use of a variable input. Marginal revenue product is the marginal revenue times the marginal product. The marginal input cost is the change in total cost due to hiring another unit of the input.
3. The profit maximizing firm will hire a variable input to the point where the marginal revenue product equals the marginal input cost. If marginal revenue product is greater than marginal input cost, then by increasing input, total revenue goes up by marginal revenue product and total cost goes up by marginal input cost. Since total revenue increases more than total cost, profit goes up.
4. If marginal revenue product is less than marginal input cost, then by reducing input, total revenue goes down by marginal revenue product and total cost goes down by marginal input cost. Since total cost goes down more than total revenue, profit goes up.
5. The input demand curve in the case of perfect competition is the marginal revenue product curve. The demand curve slopes downward since marginal revenue product equals , marginal revenue times marginal product, and marginal product slopes downward by the law of diminishing returns.
6. Demand for labor depends on the marginal revenue and the marginal product of labor. If marginal revenue increases, so does the demand for labor. If technology increases the marginal product of labor, the demand for 1 labor increases.
7. In perfectly competitive markets, wages are determined by supply and demand.

MATCHING

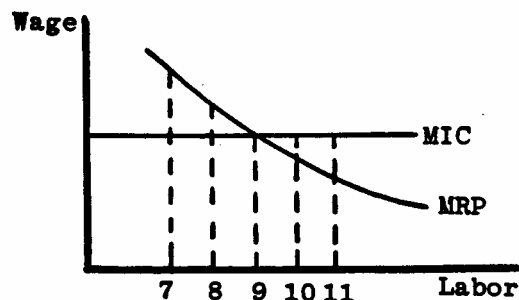
- | | | | |
|-------|-----------------------------|----|---|
| _____ | 1. marginal revenue product | a. | the quantity of labor so that the marginal revenue product equals the marginal input cost |
| _____ | 2. marginal input cost | b. | the added total cost when an added unit of labor is hired |
| _____ | 3. profit maximization | c. | the added total revenue generated by the output from an added unit of labor |

TRUE-FALSE

- | | |
|-------|---|
| _____ | 1. If we add labor when the marginal input cost exceeds the marginal revenue product, then profit will rise. |
| _____ | 2. The marginal revenue product has a negative slope due to diminishing returns. |
| _____ | 3. In the case the firm buys its inputs competitively, the marginal input cost will be positively sloped. |
| _____ | 4. In the case the firm is perfectly competitive, the labor demand is higher than the marginal revenue product. |
| _____ | 5. Input demand has a negative slope because of diminishing returns. |

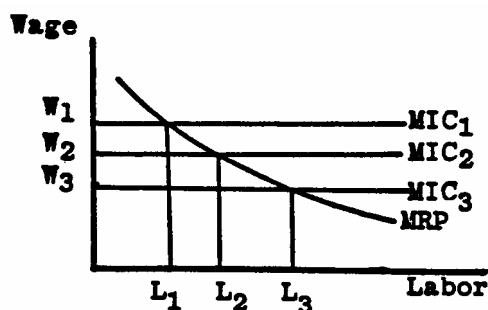
PROBLEMS

1. a. Find the profit maximizing use of labor in the following graph. _____

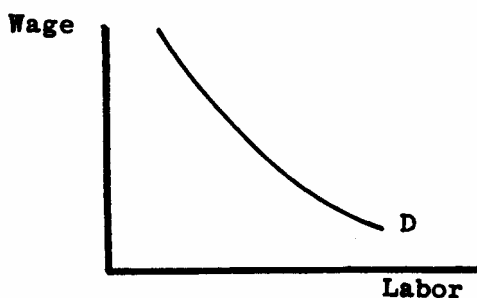


- b. If labor is increased from 7 to 8, what happens to profit? Why? _____
- c. If labor is decreased from 11 to 10, what happens to profit? Why? _____

2.



- a. How much labor is hired at a wage of W_1 ? _____
- b. How much labor is hired at a wage of W_2 ? _____
- c. How much labor is hired at a wage of W_3 ? _____
- d. What is the demand curve for labor? Why? _____
3. If demand for output falls, what will happen to the demand for labor? Illustrate your answer with a graph.



IN THE NEWS

1. The demand for computers is up. The manufacturer is trying to decide whether or not to increase employment.
- a. How does the manufacturer make this decision? _____
- b. How can the manufacturer decide whether to start a new shift or work a current shift overtime? _____
2. There has been an increase in the sales of wood burning stoves and fireplaces. This has increased the need for more chimney sweeps, and there is an increase in employment of chimney sweeps.

- a. How can a firm specializing in chimney maintenance decide whether or not to hire another chimney sweep? _____
 - b. How could a person decide whether to become a chimney sweep? _____
3. A shake-out is starting in the computer industry. Some small firms that have been relatively profitable are now finding it hard to compete against IBM, AT&T, and NCR. These smaller firms are starting to cut back employment and production.
- a. How can a firm decide whether workers should be laid off or not? _____
 - b. Much of the shake-out in computers is not in production workers, but white collar workers in middle management. How can a firm measure the MRP of these workers? _____
4. Blue Cross and Blue Shield are non-profit health insurance companies. They employ many people to process claims and take care of clerical matters.

We know that firms interested in maximizing profit hire so that $MRP = MIC$. But Blue Cross does not maximize profit. Discuss how it might make hiring decisions.

5. Nurses are an important component of a doctor's office. The nurse can relieve the doctor of some responsibilities and help the doctor be more productive. It is easy to see why the doctor's office is an important source of employment for nurses.
- a. How can a doctor decide whether or not to hire another nurse? _____
 - b. Discuss how the law of diminishing returns affects the demand for office nurses. _____
6. Enrollment in college seems to go in cycles. When the economy is growing rapidly, there is a decrease in college enrollment. When the economy slows down, enrollment goes up.
- a. If the economy is growing and demand for goods is growing, what happens to the demand for labor? _____
 - b. What do you expect to happen to the wage? _____
 - c. If wages go up, what happens to the opportunity cost of being in college? _____
 - d. What happens to enrollment in colleges when wages go up? _____

PRACTICE TEST

Circle the correct answer.

1. To hire the next worker the firm pays \$50. Fifty dollars is the:
 - a. marginal input cost.
 - b. marginal cost.
 - c. marginal revenue product.
 - d. marginal revenue.

2. When the marginal revenue product is greater than the marginal input cost of labor, the profit maximizing firm will:
 - a. hire more.
 - b. hire less.
 - c. maintain the same employment.
 - d. decrease output.

3. Profit is maximized when:
 - a. marginal revenue product is greater than marginal input cost.
 - b. marginal revenue product equals marginal input cost.
 - c. marginal revenue product is less than marginal input cost.
 - d. output is maximized.

4. The firm's demand for labor is:
 - a. the marginal revenue product curve.
 - b. the marginal input cost curve.
 - c. the marginal cost curve.
 - d. undetermined.

5. For a firm buying labor competitively, the marginal input cost is equal to the:
 - a. wage.
 - b. interest rate.
 - c. price of output.
 - d. cost of raw materials.

ANSWERS

Matching

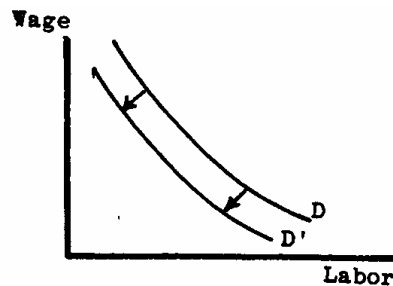
1. c
2. b
3. a

True-False

1. F
2. T
3. F
4. F
5. T

Problems

1. a. The profit maximizing point occurs at 9 units of labor, where $MIC = MRP$.
 b. Profit will rise because the extra revenue the labor provides is greater than the extra cost of the labor.
 c. Profit will rise because the reduction in cost due to less labor is more than the revenue that the labor was providing.
2. a. L_1 is hired at W_1 .
 b. L_2 is hired at W_2 .
 c. L_3 is hired at W_3 .
 d. The demand for labor is the MRP curve since at each wage the quantity of labor the profit maximizing firm would choose is on the MRP curve.
3. When the demand for output falls, the demand for labor will also fall.



In the News

1. a. The manufacturer will examine the impact on profit of each alternative and choose the one that Yields the greater profit. The firm will look at the extra cost of the extra employment and weigh that against the extra revenue that the extra employment could produce.
 b. In this case, if the extra revenue is the same from either alternative, the firm will choose the alternative with the smaller added cost.
2. a. If the MRP of the added worker is greater than the cost of the worker, the MIC, then the firm would hire another chimney sweep.
 b. If the wage a worker could obtain by being a chimney sweep is greater than other alternatives and if the work seems appealing, then an individual might want to choose this line of work.
3. a. The firm should compare the MRP of the worker with the MIC. If the MIC is greater than the MRP, the worker will be laid off in a profit maximizing firm.
 b. For workers who do not produce a tangible output, the calculation of the MRP is difficult. The question the firm must ask is, "If we let this person go, would the reduction in cost be greater than the value of this person's output? Who would have to do this person's work? Would they have the time, knowledge and energy to do the job?" If the MIC of the worker is greater than the MRP, then the worker should be laid off.
4. For firms that do not maximize profits, the productivity of the worker is still an important consideration. The firm will not be able to keep workers who do not contribute since the firm is only one of many selling health insurance. If the cost of operating Blue Cross gets

too high, people will not want to have the expensive Blue Cross insurance. The firm must try to minimize the cost of providing service and to do so requires keeping people who contribute at least as much as they cost.

5. a. The doctor will compare the added revenue that the nurse provides to the added cost. If the nurse can help the doctor see sufficiently more patients, then the nurse will be worth the cost and will be hired.
- b. The law of diminishing returns says that as more nurses are added, the output of the doctor's office will grow but at a slower and slower rate. Since nurses are not a perfect substitute for a doctor, nurses can be substituted for a doctor only to a point. More nurses may be able to get more patients ready for the doctor and give shots, take temperatures and dispense information, but at some point, the patient will want to see the doctor and the doctor's scarce time cannot be replaced by the nurse. So eventually an added nurse will not increase the output of the doctor's office as much as the last previous nurse. The marginal revenue times a smaller marginal product means more nurses would be hired only at a lower wage .
6. a. If the demand for goods is increasing, we would expect the demand for labor to increase also.
- b. If the demand for labor increases, then the wage will also rise.
- c. The opportunity cost of being in college is the wage that could be earned when you are in the classroom. So the opportunity cost of being in college goes up.
- d. Enrollment will fall.

Practice Test

1.a., 2.a., 3.b., 4.a., 5.a.