

The provisions of passenger essay sample

[Economics](#)



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7. 6. A farmer uses three inputs to produce vegetables: land, capital, and labor. The production function for the farm exhibits diminishing marginal rate of technical substitution. a) In the short run the amount of land is fixed. Suppose the prices of capital and labor both increase by 5 percent. What happens to the cost-minimizing quantities of labor and capital for a given output level? Remember that there are three inputs, one of which is fixed. b) Suppose only the cost of labor goes up by 5 percent. What happens to the cost-minimizing quantity of labor and capital in the short run. a) The amount of land used in production is fixed in the short-run. Hence, in the short-run the farmer chooses amount of capital and labor. It follows that cost-minimizing quantities of labor and capital have to satisfy equation $MPL / MPK = w/r$ where w and r denote prices of labor and capital. Notice that $w/r = (1.05 w) / (1.05 r)$. The cost-minimizing quantities of inputs, for each level of output, do not change when prices of both inputs go up by 5% and quantity of land is fixed. b) For a given output level, the cost-minimizing farmer uses more capital and less labor.

7. 9. Suppose the production of airframes is characterized by a Cobb-Douglas production function: $Q = LK$. The marginal products for this production function are $MPL = K$ and $MPK = L$. Suppose the price of labor is \$10 per unit and the price of capital is \$1 per unit. Find the cost-minimizing combination of labor and capital if the manufacturer wants to produce 121,000 airframes.

The tangency condition implies

Substituting into the production function yields

Since , . The cost-minimizing quantities of labor and capital to produce 121,000 airframes are and .

7. 16. A construction company has two types of employees: skilled and unskilled. A skilled employee can build 1 yard of a brick wall in one hour. An unskilled employee needs twice as much time to build the same wall. The hourly wage of a skilled employee is \$15. The hourly wage of an unskilled employee is \$8. a) Write down a production function with labor. The inputs are the number of hours of skilled workers, L_S , the number of hours worked by unskilled employees, L_U , and the output is the number of yards of brick wall, Q . b) The firm needs to build 100 yards of a wall. Sketch the isoquant that shows all combinations of skilled and unskilled labor that result in building 100 yards of the wall. c) What is the cost-minimizing way to build 100 yards of a wall? Illustrate your answer on the graph in part (b).

a) The production function is $Q = L_S + \frac{1}{2} L_U$ where L_S denotes hours worked by skilled workers and L_U denotes hours worked by unskilled workers. Both types of labor are perfect substitutes.

b) The isoquant is a straight line.

c) $MPL_S/w_S = 1/15$; $MPL_U/w_U = 0.5/8 = 1/16$. Thus, the “bang for the buck” is higher for skilled labor, and the firm will use only skilled labor. Note that the total cost of building 100 yards with skilled labor is

$$(100 \text{ hours}) (\$15/\text{hour}) = \$1500$$

The total cost of building 100 yards with unskilled labor is

$$(200 \text{ hours})(\$8/\text{hour}) = \$1600.$$

The isocost line representing a \$1500 expenditure is drawn as a dotted line in the graph in (b). The isocost line is more steeply sloped than the isoquant in the graph because the marginal rate of technical substitution of unskilled labor for unskilled labor is equal to $\frac{1}{2}$, while the ratio of input prices is equal to $\frac{8}{15}$.

7. 24. Consider the production function $Q = K + \sqrt{L}$. For this production function, $MPL = 1/(2\sqrt{L})$ and $MPK = 1$. Derive the input demand curves for L and K, as a function of the input prices w (price of labor services) and r (price of capital services). Show that at an interior optimum (with $K > 0$ and $L > 0$) the amount of L demanded does not depend on Q. What does this imply about the expansion path? The tangency condition implies that. Clearly the demand curve for L is not a function of the level of output, Q. Therefore, as the level of output changes, the amount of labor is constant. Therefore, if we were to graph isoquants with labor on the horizontal axis, the expansion path for labor would just be a straight, vertical line.

The demand curve for capital can be derived by substituting the demand curve for labor into the production function. That is, .

8. 17. A packaging firm relies on the production function $Q = KL + K$, with $MPL = K$ and $MPK = L + 1$. Assume that the firm's optimal input combination is interior (it uses positive amounts of both inputs). Derive its long-run total cost curve in terms of the input prices, w and r . Verify that if the input prices double, then total cost doubles as well.

Since we can assume an interior solution, the tangency condition must hold. Therefore the optimal bundle must be such that . This means . Substituting
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this back into the production function, we see that $\frac{\partial TC}{\partial w} = -1$, so $\frac{\partial TC}{\partial w} = -1$. This implies that $\frac{\partial TC}{\partial w} = -1$. The total cost curve is then $TC = 2w + 2r$. If we substitute $2w$ and $2r$ in the place of w and r respectively, we get $TC_2 = 2(2w) + 2(2r) = 4w + 4r = 2(2w + 2r) = 2TC$, so total cost does indeed double when input prices double.

8. 31 A railroad has two types of services: freight service and passenger service. The stand-alone cost for freight service is $TC_1 = 500 + Q_1$, where Q_1 is the number of ton-miles of freight hauled each day equals and TC_1 is the total cost in thousands of dollars per day. The stand-alone cost for passenger service is $TC_2 = 1000 + 2Q_2$, where Q_2 is the number of passenger-miles per day equals and TC_2 is the total cost in thousands of dollars per day. When a railroad offers both services jointly its total is $(Q_1, Q_2) = 2000 + Q_1 + 2Q_2$. Do the provision of passenger and freight service exhibit economies of scope?

The provisions of passenger and freight service do not exhibit economies of scope. Economies of scope would be present if, for all positive values of Q_1 and Q_2 , the total cost of offering both services together is less than the sum of the stand-alone costs of offering each service. However, in this case, the reverse is true: the sum of the stand-alone costs of freight and passenger services is $1,500 + Q_1 + 2Q_2$ which is less than the total cost if both services are offered together, which is $2,000 + Q_1 + 2Q_2$.