

Unit 9. Factor markets
Free response questions
APT 2010 (Form B)

Number of Workers	Marginal Revenue Product per Day
1	\$450
2	\$500
3	\$450
4	\$400
5	\$300
6	\$100

2. The table above gives the short-run marginal revenue product of labor per day for a perfectly competitive firm. The firm is currently selling its product at the market price of \$5.
- Calculate the marginal (physical) product of the third worker.
 - Define the law of diminishing marginal returns and explain why it occurs.
 - Diminishing marginal returns first occur with the hiring of which worker for the firm?
 - What is the highest daily wage that the firm is willing to pay to hire the fifth worker?
 - What will happen to the demand for labor if the market price of the product increases? Explain.

APT 2005

3. P & L is a profit-maximizing shirt-manufacturing firm. The firm can sell all the shirts it can produce to retailers at a price of \$20 each. P & L can hire all of the workers it wants at a market wage of \$120 per day per worker. The table below shows the firm's short-run production function.

Number of Workers	Number of Shirts per Day
0	0
1	10
2	25
3	45
4	60
5	72
6	80
7	85
8	82

- In what kind of market structure does this firm sell its output? How can you tell?
- In what kind of market structure does this firm hire its workers? How can you tell?
- Calculate the marginal revenue product of the third worker. Show your work.
- How many workers should the firm hire to maximize profit? Explain.

APT 2002 (continued)

1. Claire invented product X and obtained a patent to prevent other firms from producing X. She is currently producing product X and earning positive economic profits.
 - (a) Using a correctly labeled graph, show each of the following for Claire if she maximizes profits.
 - (i) Output
 - (ii) Price
 - (iii) Economic profits
 - (b) Assume that Claire hires labor in a perfectly competitive labor market. Using correctly labeled side-by-side graphs for the labor market and for Claire, show each of the following.
 - (i) The wage rate of the workers
 - (ii) The number of workers Claire will hire
 - (c) Assume now the patent expires and many firms produce the identical product that Claire produces. Using correctly labeled side-by-side graphs for the industry and the firm, show each of the following in long-run equilibrium.
 - (i) Industry price and output
 - (ii) The typical firm's price and output

APT 2008 (Form B)

3. GW Company produces and sells hats in a perfectly competitive market at a price of \$2 per hat. Assume that labor is the only variable input and the wage rate is \$15 per unit of labor per day. The table below shows GW's short-run production function for hats.

Number of workers per day	0	1	2	3	4	5	6
Output of hats per day	0	10	26	36	44	49	52

- (a) After which worker do diminishing marginal returns begin?
- (b) Calculate the marginal physical product of the fifth worker.
- (c) Calculate the marginal revenue product of the third worker.
- (d) How many workers will GW hire to maximize profit?
- (e) If GW Company has fixed costs equal to \$20, what will be the company's short-run economic profits from hiring two workers?
- (f) If the price of hats increases, what will happen to the number of workers hired in the short run? Explain.

APT 2010 (continued)

2. The John Lamb Company, a profit-maximizing firm producing widgets, is in a perfectly competitive widget market. Assume John Lamb employs a fixed number of employees and rents a machine for a variable number of hours from a perfectly competitive market.
- (a) Using correctly labeled side-by-side graphs of the factor market for machines and the John Lamb Company, show each of the following.
- (i) The equilibrium rental price of machines in the factor market, labeled as P_R
 - (ii) John Lamb's equilibrium rental quantity of machines, labeled as Q_L
- (b) Assume that the popularity of widgets declines, decreasing the demand for widgets. What will happen to each of the following?
- (i) Marginal product curve for machine-hours
 - (ii) Marginal revenue product curve for machine-hours. Explain.
- (c) John Lamb is employing the cost-minimizing combination of inputs. The marginal product of labor is 28 widgets per worker hour and the wage rate is \$14 per hour. The marginal product of the machine is 60 widgets per machine-hour. What is the hourly rental price of a machine?

APT 2003 (Form B)

3. Leadmill Company is a perfectly competitive pencil-manufacturing firm. Leadmill can sell all of the pencils it produces at a market price of \$2 per dozen and can hire all the workers it needs at a wage rate of \$8 per hour. The output of the workers at Leadmill is given in the table below.

<u>Number of Workers</u>	<u>Output (dozens)</u>
0	0
1	8
2	15
3	21
4	26
5	30
6	33
7	35
8	36

- (a) Using marginal analysis, state the condition for employing the profit-maximizing number of workers.
- (b) How many workers should Leadmill hire to maximize profit? Explain how you derived that number.
- (c) If the wage rate decreased to \$6 dollars per hour, how many workers would Leadmill employ?
- (d) If the wage rate was \$6 per hour and the price of pencils decreased to \$1 per dozen, how many workers would Leadmill employ?

APT 2007

Number of Unskilled Workers Hired	Quantity of Radios Produced (per day)
0	0
1	20
2	45
3	60
4	70
5	75
6	79
7	80

2. Assume that HZRad Company produces clock radios as shown in the short-run production function in the table above. HZRad can sell all the clock radios it produces at a market price of \$20 each and can hire all the unskilled labor it needs at a wage of \$90 per day per worker. Assume also that labor is the only variable input.
- Using the specific information above, draw a correctly labeled graph of HZRad's current supply curve for unskilled labor.
 - What is HZRad's profit-maximizing output level? Explain.
 - Suppose that HZRad is the first company to use a new technology that increases the productivity of its unskilled workers.
 - How will the new technology affect the quantity of unskilled labor HZRad hires? Explain.
 - How will the new technology affect the wage paid to HZRad's unskilled workers?

APT 2011 (continued)

2. Assume that the market for avocados is perfectly competitive. The typical firm is earning positive economic profit in the short-run equilibrium.
- Draw a correctly labeled graph for the typical firm, illustrating the short-run equilibrium and labeling the equilibrium market price and output P_E and Q_E , respectively.
 - Assume there is an increase in the market wage rate for labor, a variable input. Show on your graph in part (a) the effect of the wage increase on the marginal cost curve in the short run.
 - Assume that avocado producers hire workers from a perfectly competitive labor market. Draw a graph of labor supply and demand for the typical firm and label the supply curve MFC and the demand curve MRP. Assume the market wage rate increases from w_1 to w_2 . Show the effect of the wage increase on the graph, labeling the initial quantity of labor hired QL_1 and the new quantity of labor hired QL_2 .

APT 1999

Question 1

In the United States, textiles are sold in two separate and perfectly competitive markets. The textiles produced in the United States are sold in market A, and imported textiles are sold in market B.

- a. Explain how the supply curve for textiles produced in the United States will be affected by each of the following.
 - i. A decrease in the number of firms in the United States producing textiles
 - ii. An increase in the price of textiles

Assume that textiles produced in market A and market B are close substitutes.

- b. Using one graph for market A and another for market B, show and explain how a substantial increase in the tariff on textiles imported into the United States will affect each of the following.
 - i. Equilibrium price and quantity of textiles sold in market B (imported textiles)
 - ii. Equilibrium price and quantity of textiles sold in market A (textiles produced in the United States)

Assume that the labor market for textile workers is perfectly competitive. Following a decrease in the supply of textile workers, the wage rate of textile workers increases.

- c. Using a new graph for market A, show and explain how a substantial increase in the wage rate of textile workers will affect the equilibrium price and quantity of textiles sold in market A.
- d. Using a graph, show and explain how the increase in the wage rate of textile workers and the change in the equilibrium price and quantity of textiles you identified in part (c) will affect each of the following.
 - i. A firm's demand for labor
 - ii. A firm's supply of labor

APT 2002 (Form B)

3. The labor market in the town of Bazra is perfectly competitive, and 10 percent of the labor force is employed in the clothing industry.
 - (a) Assume that the clothing manufacturers close their plants in Bazra. Using a correctly labeled supply and demand graph, predict the impact that closing these plants will have on each of the following.
 - (i) The wage rate and number of workers employed in Bazra
 - (ii) The number of workers in Bazra looking for work who cannot find employment at the wage rate you identified in (i)
 - (b) After the clothing manufacturers closed their plants in Bazra, the town passes a law that establishes an effective minimum wage. What impact will this minimum wage have on each of the following?
 - (i) The wage rate and number of workers employed in Bazra
 - (ii) The number of workers in Bazra looking for work who cannot find employment
 - (c) Assume that the minimum wage remains in effect and there is an increase in the demand for goods produced in Bazra. What happens to employment in Bazra? Explain why.