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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Michelle's Accounting Company.

Number of Bookkeepers	Total Product per Hour
1	8
2	20
3	40
4	55
5	65
6	70
7	65
8	55

(a) After which bookkeeper do diminishing marginal returns begin for Michelle's Accounting Company? Explain using numbers.

(b) Assume Michelle's Accounting Company sells its accounting services in a perfectly competitive market at a price of $20. Calculate the marginal revenue product of the sixth bookkeeper. Show your work.

(c) Michelle's Accounting Company hires bookkeepers in a perfectly competitive labor market for bookkeepers at a wage rate of $110 per hour, and the market price of services remains $20. How many bookkeepers will Michelle's Accounting Company hire to maximize its profit? Explain using marginal analysis.

(d) Assume bookkeepers and accounting software are substitutes in providing accounting services by all accounting firms in the market. If accounting software, a fixed input, becomes less expensive and Michelle's Accounting Company provides the same quantity of accounting services, will each of the following increase, decrease, or stay the same?
(i) The wage rate Michelle's Accounting Company will pay its bookkeepers. Explain.
(ii) The demand curve for bookkeepers for Michelle's Accounting Company. Explain.

1. Respond to all parts of the question.

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k

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Ahmal's Manufacturing Company.

Number of Machinists	Total Product per Hour
1	20
2	45
3	75
4	110
5	150
6	180
7	200
8	198

(a) Beginning with which machinist do diminishing marginal returns set in for Ahmal's Manufacturing Company? Explain using numbers.

(b) Assume Ahmal's Manufacturing Company sells its goods in a perfectly competitive market at a unit price of $3. Calculate the marginal revenue product of the third machinist. Show your work.

(c) Ahmal's Manufacturing Company hires machinists in a perfectly competitive labor market for machinists at a wage rate of $40 per hour, and the market price of services remains $3. How many machinists will Ahmal's Manufacturing Company hire to maximize its profit? Explain using marginal analysis.

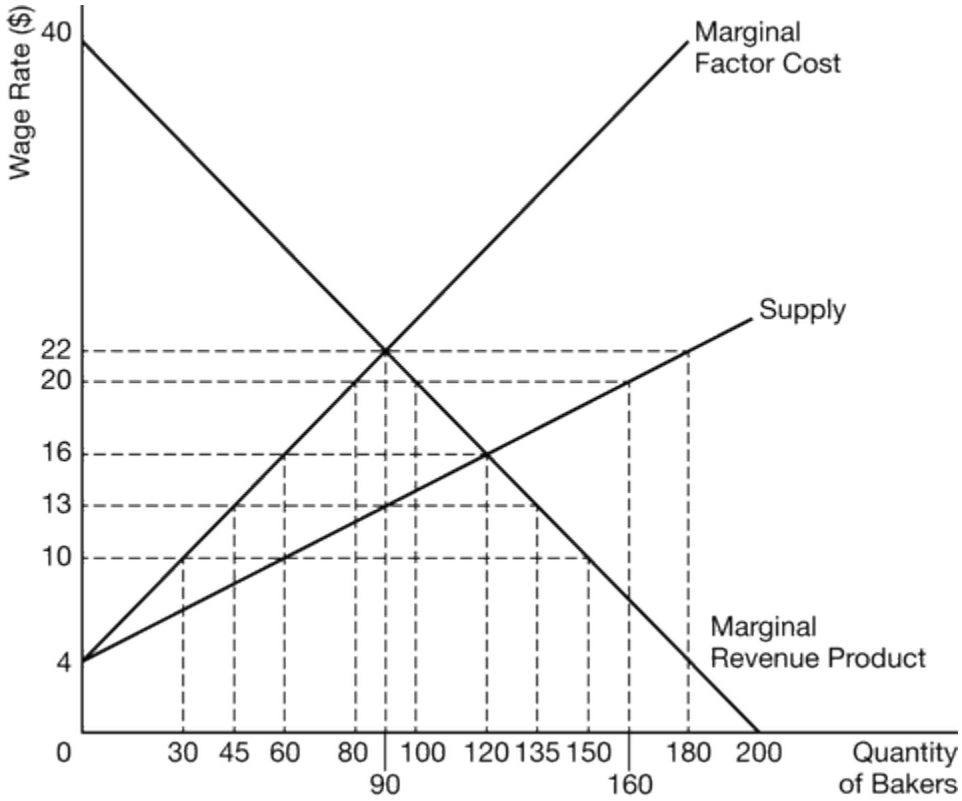
(d) Assume there is a decrease in the productivity of all workers in the labor market for machinists. What will happen to each of the following in equilibrium?
(i) The number of workers hired in the labor market for machinists. Explain.
(ii) The wage rate Ahmal's Manufacturing Company will pay its machinists. Explain.

2. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Bobby's Bakehouse is the only bakery in a small remote town, and Bobby's Bakehouse is the only employer of bakers in the area. The graph below shows the market for bakers with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) If the wage rate is $13, state whether there will be a shortage or a surplus of bakers and calculate its size. Show your work.

(b) Identify the profit-maximizing number of bakers that Bobby's Bakehouse will hire. Explain using the labeling on the graph.

(c) Identify the profit-maximizing wage rate that Bobby's Bakehouse will pay its bakers. Explain using the labeling on the graph.

(d) If the marginal product of bakers increases, what will happen to the quantity of output produced by Bobby's Bakehouse? Explain.

(e) Assume instead that Bobby's Bakehouse uses both labor and capital in its production of baked goods. The marginal product of the last unit of labor hired is 16 baked goods per hour and the marginal product of the last unit of capital rented is 50 baked goods per hour; the hourly wage rate for labor is $8 and the hourly rental price for capital is $5. To minimize

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the cost of producing its current level of output, should Bobby's Bakehouse rent more capital, less capital, or the same amount of capital? Explain using marginal analysis.

3. Respond to parts of the question.

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Bob's Barber Shop.

Number of Barbers	Total Product per Hour
1	3
2	7
3	12
4	16
5	19
6	21
7	22
8	20

(a) After which barber do diminishing marginal returns begin for Bob's Barber Shop? Explain using numbers.

(b) Assume Bob's Barber Shop sells haircut services in a perfectly competitive market at a unit price of $9. Calculate the marginal revenue product of the sixth barber. Show your work.

(c) Bob's Barber Shop hires barbers in a perfectly competitive labor market for barbers at a wage rate of $25 per hour, and the market price of haircut services remains $9. How many barbers will Bob's Barber Shop hire to maximize its profit? Explain using marginal analysis.

(d) Assume there is an increase in the demand for haircut services in the market. What will happen to each of the following?
(i) The market wage rate. Explain.
(ii) The marginal revenue product curve for Bob's Barber Shop. Explain.

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4. Respond to all parts of the question.

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Camila's Convenience Store.

Number of Clerks	Total Product per Hour
1	5
2	13
3	23
4	35
5	50
6	62
7	72
8	76

(a) After which clerk do diminishing marginal returns begin for Camila's Convenience Store? Explain using numbers.

(b) Assume Camila's Convenience Store sells its retail goods in a perfectly competitive market at a price of $5. Calculate the marginal revenue product of the fifth clerk. Show your work.

(c) Camila's Convenience Store hires clerks in a perfectly competitive labor market for clerks at a market wage of $24 per hour, and the market price of services remains $5. How many clerks will Camila's Convenience Store hire to maximize its profit? Explain using marginal analysis.

(d) Assume the market price of retail goods decreases as a result of a decrease in the number of consumers and Camila's Convenience Store continues to operate. What will happen to each of the following?
(i) The marginal factor cost for Camila's Convenience Store. Explain.
(ii) The marginal revenue product curve for Camila's Convenience Store. Explain.

5. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Briana's Brick Shop.

Number of Brick Masons	Total Product per Hour
1	9
2	19
3	30
4	42
5	52
6	61
7	63
8	60

(a) After which brick mason do diminishing marginal returns begin for Briana's Brick Shop? Explain using numbers.

(b) Assume Briana's Brick Shop sells its bricks in a perfectly competitive market at a price of $6. Calculate the marginal revenue product of the seventh brick mason. Show your work.

(c) Briana's Brick Shop hires brick masons in a perfectly competitive labor market for brick masons at a wage rate of $48 per hour, and the market price of bricks remains $6. How many brick masons will Briana's Brick Shop hire to maximize its profit? Explain using marginal analysis.

(d) Assume brick masons and machines are substitutes in the production of bricks by all brick-making firms in the market. If machines, a fixed input, become more expensive and Briana's Brick Shop produces the same quantity of bricks, will each of the following increase, decrease, or stay the same?
(i) The wage rate Briana's Brick Shop will pay its brick masons. Explain.
(ii) The demand curve for brick masons for Briana's Brick Shop. Explain.

6. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Phyliss's Carpentry Contractors.

Number of Carpenters	Total Product per Hour
1	200
2	255
3	305
4	345
5	380
6	410
7	435
8	455

(a) Beginning with which carpenter do diminishing marginal returns set in for Phyliss's Carpentry Contractors? Explain using numbers.

(b) Assume Phyliss's Carpentry Contractors sells its carpentry services in a perfectly competitive market at a price of $2. Calculate the marginal revenue product of the fifth carpenter. Show your work.

(c) Phyliss's Carpentry Contractors hires carpenters in a perfectly competitive labor market for carpenters at a wage rate of $90 per hour, and the market price of services remains $2. How many carpenters will Phyliss's Carpentry Contractors hire to maximize its profit? Explain using marginal analysis.

(d) Assume carpenters must pay for a certification exam before they can work in this industry. If the cost of that exam decreases, what will happen to each of the following in equilibrium?
(i) The market wage rate. Explain.
(ii) The number of workers hired in the labor market. Explain.

7. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Chukwuma's Salon.

Number of Stylists	Total Product per Hour
1	6
2	13
3	21
4	30
5	40
6	47
7	50
8	51

(a) After which stylist do diminishing marginal returns begin for Chukwuma's Salon? Explain using numbers.

(b) Assume Chukwuma's Salon sells its hair styling services in a perfectly competitive market at a price of $6. Calculate the marginal revenue product of the third stylist. Show your work.

(c) Chukwuma's Salon hires stylists in a perfectly competitive labor market for stylists at a wage rate of $35 per hour, and the market price of services remains $6. How many stylists will Chukwuma's Salon hire to maximize its profit? Explain using marginal analysis.

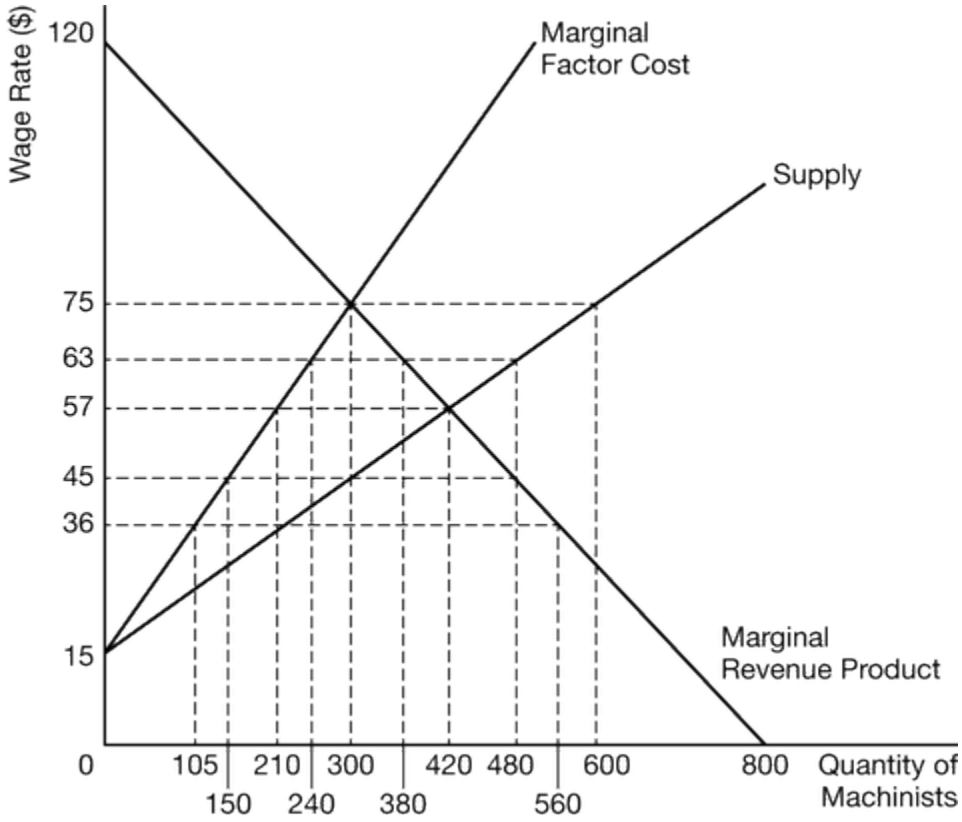
(d) Assume the market price of hair styling services increases as a result of an increase in the number of customers. What will happen to each of the following?
(i) The marginal factor cost for Chukwuma's Salon. Explain.
(ii) The marginal revenue product curve for Chukwuma's Salon. Explain.

8. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Central Manufacturing Company is the only manufacturing facility in a small remote town, and Central Manufacturing Company is the only employer of machinists in the area. The graph below shows the market for machinists with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) If the wage rate is $63, state whether there will be a shortage or a surplus of machinists and calculate its size. Show your work.

(b) Identify the profit-maximizing number of machinists. Explain using the labeling on the graph.

(c) Identify the profit-maximizing wage rate that Central Manufacturing Company will pay its machinists. Explain using the labeling on the graph.

(d) If the marginal product of machinists increases, what will happen to the quantity of output produced by Central Manufacturing Company? Explain.

(e) Assume instead that Central Manufacturing Company uses both labor and capital in producing widgets. The marginal product of the last unit of labor hired is 120 widgets per day and the marginal product of the last unit of capital rented is 150 widgets per day; the daily wage rate for labor is $40 and the daily rental price for capital is $30. To minimize the cost

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of producing its current level of output, should Central Manufacturing Company rent more capital, less capital, or the same amount of capital? Explain using marginal analysis.

9. Respond to all parts of the question.

CleanIt is a perfectly competitive, profit-maximizing trash collection firm. CleanIt hires workers in a perfectly competitive labor market.

a. Draw side-by-side graphs for the labor market and for CleanIt and show each of the following.
    i. The market wage, labeled W_M, and the quantity of workers hired in the market, labeled L_M
    ii. The marginal factor (resource) cost curve, labeled MFC
    iii. The marginal revenue product curve, labeled MRP
    iv. The wage paid by the firm, labeled W_F, and the quantity of workers hired by the firm, labeled L_F

b. Assume that CleanIt is the only firm in the industry to adopt a new technology. The new technology increases the productivity of CleanIt's workers.
    i. In the short run, will the wage paid by CleanIt be higher than, lower than, or equal to W_F? Explain.
    ii. In the short run, will the number of workers hired by CleanIt increase, decrease, or stay the same? Explain.

c. CleanIt uses capital in the form of trucks, which it rents for $10,000 each. The marginal product of the last truck used is 100,000 units. If CleanIt is minimizing its costs and the marginal product of the last worker hired is 500 units, calculate the wage. Show your work.

10. Respond to all parts of the question.

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Coldbox Corporation hires its workers in a perfectly competitive labor market and produces and sells frozen peas in a perfectly competitive product market. The market price for frozen peas is $4 per bag. The table below shows Coldbox' short-run production of frozen peas. Labor is the only variable input. Coldbox Corporation's fixed cost is $500.

Number of Workers	Bags of Frozen Peas
0	0
1	60
2	140
3	250
4	320
5	380
6	400

a. When Coldbox hires the second worker, does it experience diminishing returns? Explain.

b. Calculate the average fixed cost if Coldbox hires 3 workers. Show your work.

c. If the wage is $200 per worker, identify the profit-maximizing number of workers for Coldbox. Explain using marginal analysis.

d. If the price of frozen peas decreases by $2 per bag, would the number of workers hired by Coldbox be more than, less than, or equal to the number of workers you identified in part (c) ? Explain.

e. Suppose that Coldbox hires workers from a monopsonistic labor market. Would the wage be higher, lower, or equal to the equilibrium wage in a perfectly competitive labor mark*et?*

11. Respond to all parts of the question.

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Assume that Company XYZ is a profit-maximizing firm that hires its labor in a perfectly competitive labor market and sells its product in a perfectly competitive output market.

a. Define the marginal revenue product of labor (MRP_L).

b. Using correctly labeled side-by-side graphs, show each of the following.

   i. The equilibrium wage in the labor market

   ii. The labor supply curve the firm faces

   iii. The number of workers the firm will hire

c. Company XYZ develops a new technology that increases its labor productivity. Currently this technology is not available to any other firm. For Company XYZ, explain how the increased productivity will affect each of the following.

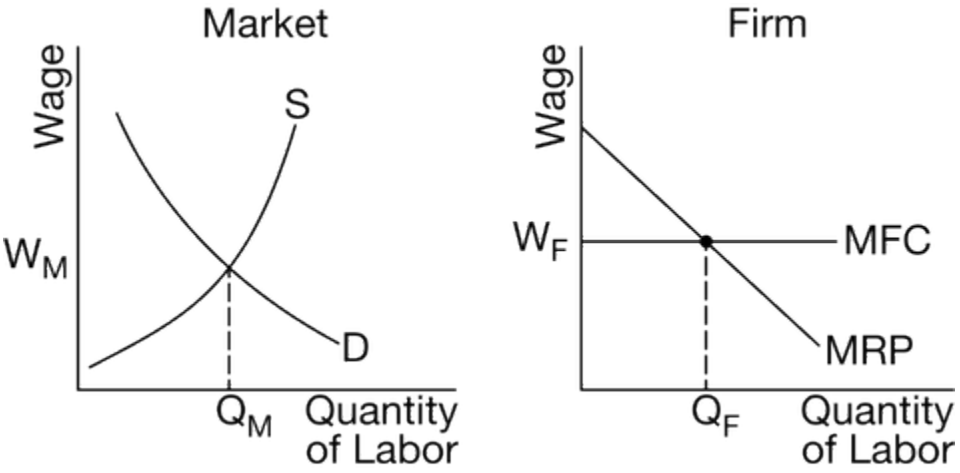
   i. Wage rates

   ii. *Number of workers hired*

12. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.



The graph above shows a labor market and a typical individual firm that is hiring labor from that market.

(a) If $W_M = W_F$, from what type of labor market does the firm hire its workers?

(b) Assume the productivity of workers increases as a result of improvement in technology. What will happen to each of the following in the short run?

(i) The market demand for labor

(ii) The wage rate the firm will pay. Explain.

(c) Suppose the firm only produces good X and that the price of good Y, a substitute good, decreases. What will happen to the optimal quantity of labor the firm will hire? Explain.

(d) If the labor market were a monopsony, would the monopsonist hire more, fewer, or the same number of workers as Q_M to maximize its profit?

13. Respond to all parts of the question.

k

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Kayla's Construction Firm.

Number of Construction Workers	Total Product per Hour
1	110
2	230
3	360
4	400
5	435
6	465
7	490
8	495

(a) Beginning with which construction worker do diminishing marginal returns set in for Kayla's Construction Firm? Explain using numbers.

(b) Assume Kayla's Construction Firm sells its services in a perfectly competitive market at a price of $3. Calculate the marginal revenue product of the fourth construction worker. Show your work.

(c)Kayla's Construction Firm hires construction workers in a perfectly competitive labor market for construction workers at a wage rate of $110 per hour, and the market price of services remains $3. How many construction workers will Kayla's Construction Firm hire to maximize its profit? Explain using marginal analysis.

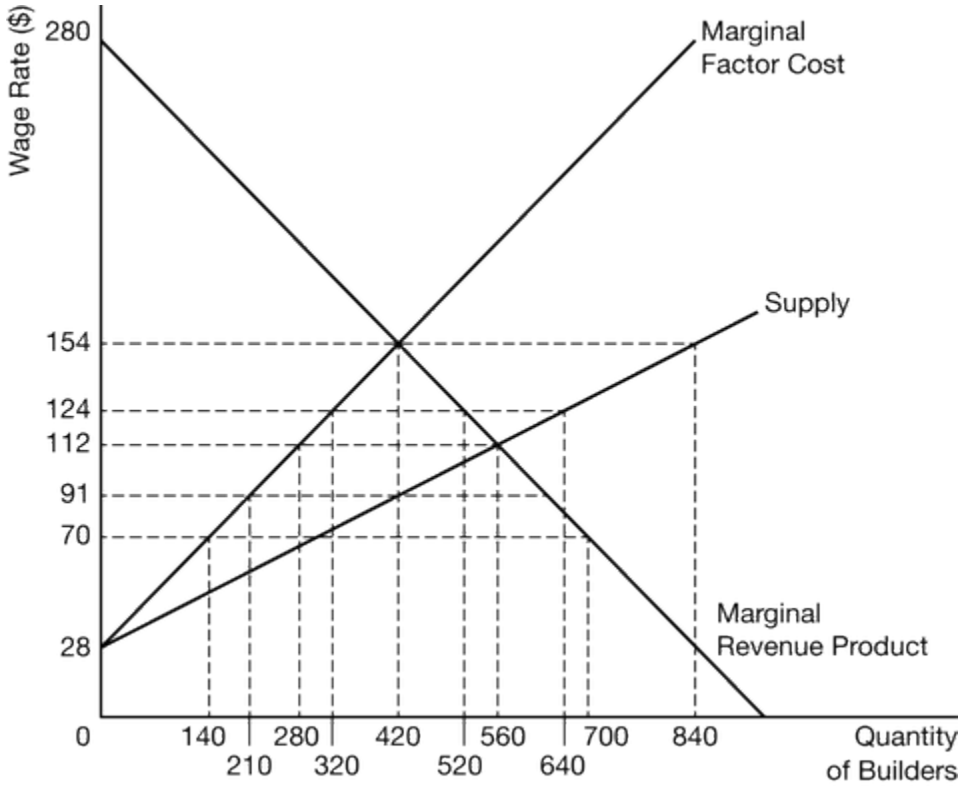
(d) Assume construction workers must pay for a certification exam before they can work in this industry. If the cost of that exam increases, what will happen to each of the following in equilibrium?
(i) The market wage rate. Explain.
(ii) The number of workers hired in the labor market. Explain.

14. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Cornel's Construction is the only builder in a small remote town, and Cornel's Construction is the only employer of builders in the area. The graph below shows the market for builders with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) If the wage rate is $124, state whether there will be a shortage or a surplus of builders and calculate its size. Show your work.

(b) Identify the profit-maximizing number of builders that Cornel's Construction will hire. Explain using the labeling on the graph.

(c) Identify the profit-maximizing wage rate that Cornel's Construction will pay its builders. Explain using the labeling on the graph.

(d) If the marginal product of builders increases, what will happen to the quantity of services provided by Cornel's Construction? Explain.

(e) Assume instead that Cornel's Construction uses both labor and capital in providing its services. The marginal product of the last unit of labor hired is 15 projects per hour and the marginal product of the last unit of capital rented is 10 projects per hour; the hourly wage rate for labor is $150 and the hourly rental price for capital is $50. To minimize the

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cost of providing its current level of output, should Cornel's Construction rent more capital, less capital, or the same amount of capital? Explain using marginal analysis.

15. Respond to all parts of the question.

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Denice's Diner.

Number of Cooks	Total Product per Hour
1	6
2	13
3	22
4	30
5	36
6	40
7	42
8	41

(a) Beginning with which cook do diminishing marginal returns set in for Denice's Diner? Explain using numbers.

(b) Assume Denice's Diner sells its meals in a perfectly competitive market at a unit price of $8. Calculate the marginal revenue product of the sixth cook. Show your work.

(c) Denice's Diner hires cooks in a perfectly competitive labor market for cooks at a wage rate of $15 per hour, and the market price of meals remains $8. How many cooks will Denice's Diner hire to maximize its profit? Explain using marginal analysis.

(d) Assume there is an increase in the productivity of all workers in the labor market for cooks. What will happen to each of the following in equilibrium?
(i) The number of workers hired in the labor market for cooks. Explain.
(ii) The wage rate Denice's Diner will pay its cooks. Explain.

16. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Esther's Travel Agency.

Number of Travel Agents	Total Product per Hour
1	22
2	55
3	85
4	110
5	130
6	140
7	145
8	135

(a) After which travel agent do diminishing marginal returns begin for Esther's Travel Agency? Explain using numbers.

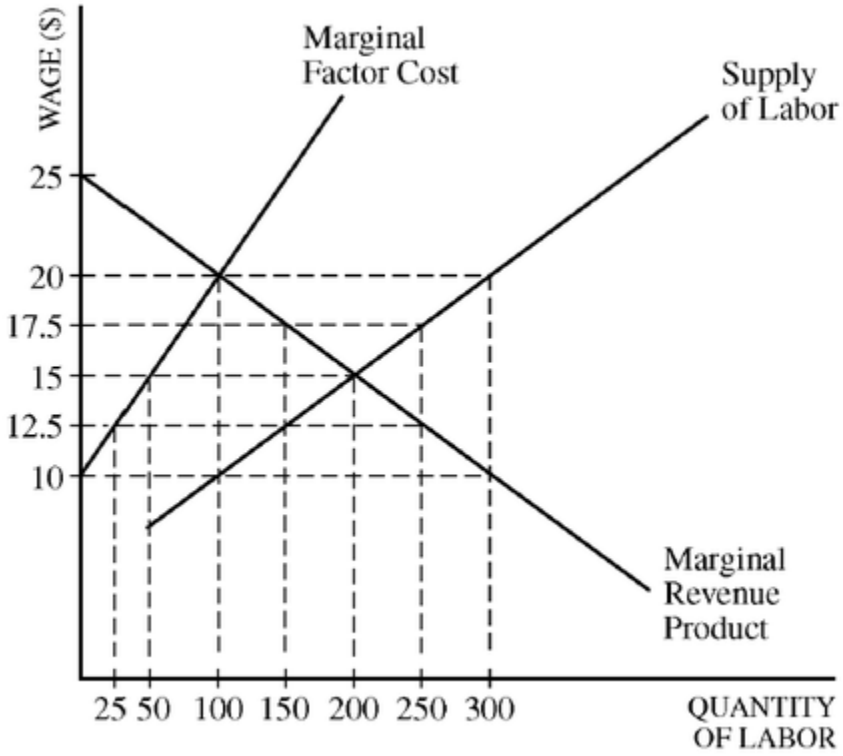
(b) Assume Esther's Travel Agency sells its travel services in a perfectly competitive market at a unit price of $5. Calculate the marginal revenue product of the fourth travel agent. Show your work.

(c) Esther's Travel Agency hires travel agents in a perfectly competitive labor market for travel agents at a wage rate of $26 per hour, and the market price of travel services remains $5. How many travel agents will Esther's Travel Agency hire to maximize its profit? Explain using marginal analysis.

(d) Assume there is a decrease in the demand for travel services in the market and Esther's Travel Agency continues to operate. What will happen to each of the following?
(i) The market wage rate. Explain.
(ii) The marginal revenue product curve for Esther's Travel Agency. Explain.

17. Respond to all parts of the question.

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Woodland is a small town in which everyone works for TreeMart, the local lumber company. TreeMart is a monopsonist in the labor market and a perfect competitor in the lumber market. In the short run, labor is the only variable input. The labor market for TreeMart is given in the graph above.

a. Identify the profit-maximizing quantity of labor for TreeMart.

b. Identify the wage rate TreeMart pays to hire the profit-maximizing quantity of labor.

c. Identify the quantity of labor hired in each of the following situations.

   i. TreeMart operates in a competitive labor market.

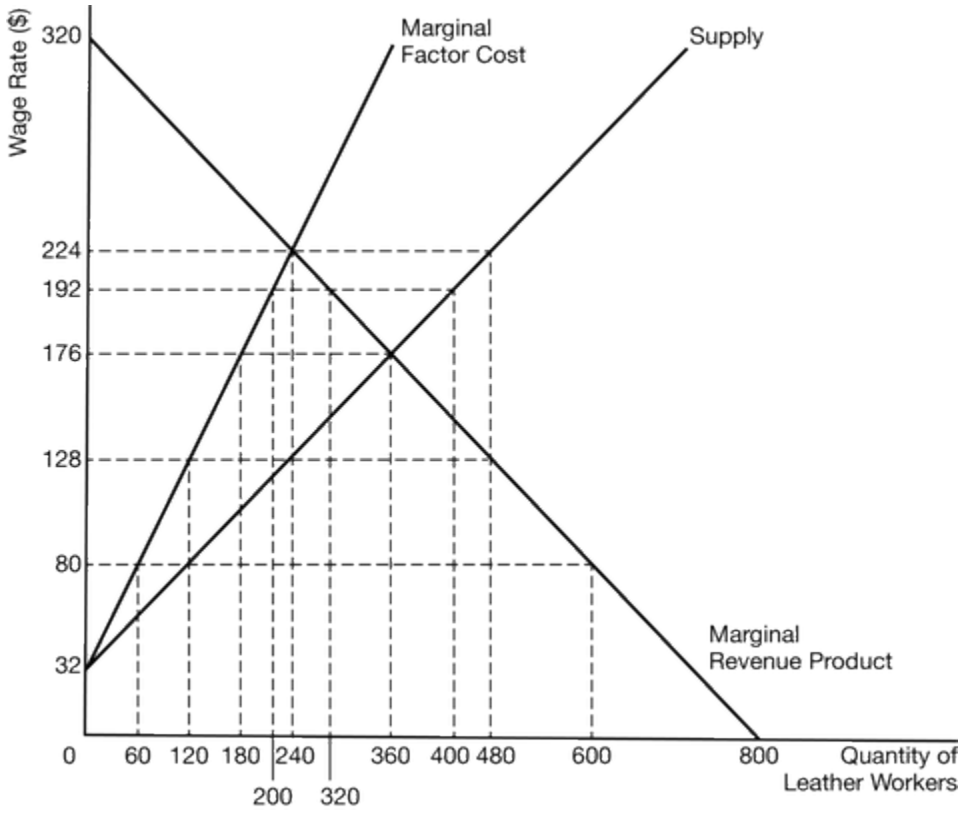
   ii. The government imposes a minimum wage of $12.5. Explain.

18. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Henri's Handbags is the only leather bags shop in a small remote town, and Henri's Handbags is the only employer of leather workers in the area. The graph below shows the market for leather workers with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) If the wage rate is $192, state whether there will be a shortage or a surplus of leather workers and calculate its size. Show your work.

(b) Identify the profit-maximizing number of leather workers that Henri's Handbags will hire. Explain using the labeling on the graph.

(c) Identify the profit-maximizing wage rate that Henri's Handbags will pay its leather workers. Explain using the labeling on the graph.

(d) Assume that the market for leather workers becomes perfectly competitive. What wage rate would Henri's Handbags pay its leather workers if it were a perfectly competitive firm? Explain using labeling on the graph.

(e) Assume instead that Henri's Handbags uses both labor and capital in its production of handbags. The marginal product of the last unit of labor hired is 180 handbags per hour and the marginal product of the last unit of capital rented is 160

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handbags per hour; the hourly wage rate for labor is $60 and the hourly rental price for capital is $20. To minimize the cost of producing its current level of output, should Henri's Handbags hire more leather workers, fewer leather workers, or the same number of leather workers? Explain using marginal analysis.

19. Respond to all parts of the question.

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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

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.

a. Using the specific information above, draw a correctly labeled graph of HZRad's current supply curve for unskilled labor.

b. What is HZRad's profit-maximizing output level? Explain.

c. Suppose that HZRad is the first company to use a new technology that increases the productivity of its unskilled workers.

    i. How will the new technology affect the quantity of unskilled labor HZRad hires? Explain.

    ii. How will the new technology affect the wage paid to HZRad's unskilled workers?

20. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Jose's Tax Office.

Number of Administrative Assistants	Total Product per Hour
1	40
2	90
3	150
4	180
5	200
6	215
7	225
8	230

(a) After which administrative assistant do diminishing marginal returns begin for Jose's Tax Office? Explain using numbers.

(b) Assume Jose's Tax Office sells its tax advisory services in a perfectly competitive market at a unit price of $4. Calculate the marginal revenue product of the fifth administrative assistant. Show your work.

(c) Jose's Tax Office hires administrative assistants in a perfectly competitive labor market for administrative assistants at a wage rate of $90 per hour, and the market price of services remains $4. How many administrative assistants will Jose's Tax Office hire to maximize its profit? Explain using marginal analysis.

(d) Assume administrative assistants and office software are substitutes in providing tax advisory services by all tax firms in the market. If office software, a fixed input, becomes more expensive and Jose's Tax Office provides the same quantity of tax advisory services, will each of the following increase, decrease, or stay the same?
(i) The wage rate Jose's Tax Office will pay its administrative assistants. Explain.
(ii) The demand curve for administrative assistants for Jose's Tax Office. Explain.

21. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Josh's Consulting Firm.

Number of Consultants	Total Product per Hour
1	21
2	43
3	66
4	88
5	108
6	126
7	141
8	151

(a) After which consultant do diminishing marginal returns begin for Josh's Consulting Firm? Explain using numbers.

(b) Assume Josh's Consulting Firm sells its consulting services in a perfectly competitive market at a unit price of $2. Calculate the marginal revenue product of the fifth consultant. Show your work.

(c) Josh's Consulting Firm hires consultants in a perfectly competitive labor market for consultants at a wage rate of $41 per hour, and the market price of consulting services remains $2. How many consultants will Josh's Consulting Firm hire to maximize its profit? Explain using marginal analysis.

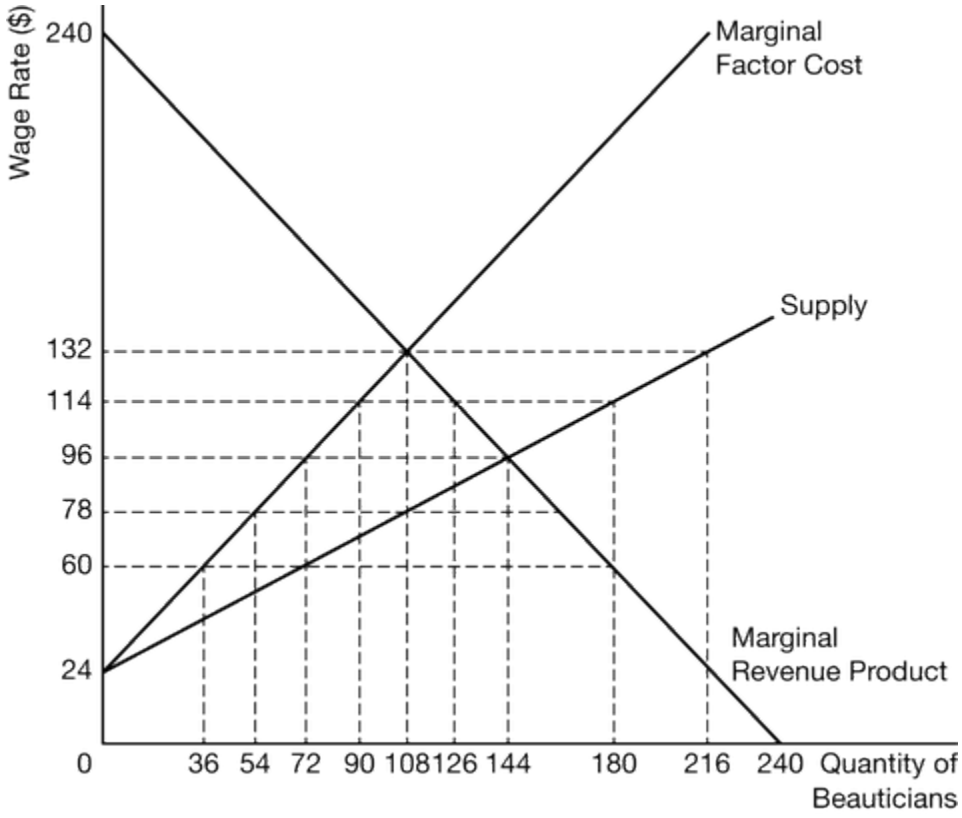
(d) Assume the market price of consulting services increases as a result of an increase in the number of consumers. What will happen to each of the following?
(i) The marginal factor cost for Josh's Consulting Firm. Explain.
(ii) The marginal revenue product curve for Josh's Consulting Firm. Explain.

22. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Karen's Cuts is the only beauty salon in a small remote town, and Karen's Cuts is the only employer of beauticians in the area. The graph below shows the market for beauticians with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a Identify the profit-maximizing number of beauticians that Karen's Cuts will hire. Explain using the labeling on the graph.

(b) Identify the profit-maximizing wage rate that Karen's Cuts will pay its beauticians. Explain using the labeling on the graph.

(c) If the wage rate is $114, state whether there will be a shortage or a surplus of beauticians and calculate its size. Show your work.

(d) Assume that the market for beauticians becomes perfectly competitive. What wage rate would Karen's Cuts pay its beauticians if it were a perfectly competitive firm? Explain using labeling on the graph.

(e) Assume instead that Karen's Cuts uses both labor and capital in providing its services. The marginal product of the last unit of labor hired is 30 cuts per day and the marginal product of the last unit of capital rented is 20 cuts per day; the daily

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wage rate for labor is $60 and the daily rental price for capital is $20. To minimize the cost of providing its current level of services, should Karen's Cuts hire more beauticians, fewer beauticians, or the same number of beauticians? Explain using marginal analysis.

23. Respond to all parts of the question.

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Lakshmi's Law Office.

Number of Clerks	*Total Product per Hour*
1	*33*
2	*68*
3	95
4	120
5	140
6	155
7	165
8	160

(a) Beginning with which clerk do diminishing marginal returns set in for Lakshmi's Law Office? Explain using numbers.

(b) Assume Lakshmi's Law Office sells its legal services in a perfectly competitive market at a unit price of $4. Calculate the marginal revenue product of the sixth clerk. Show your work.

(c) Lakshmi's Law Office hires clerks in a perfectly competitive labor market for clerks at a wage of $130 per hour, and the market price of legal services remains $4. How many clerks will Lakshmi's Law Office hire to maximize its profit? Explain using marginal analysis.

(d) Assume there is a decrease in the productivity of all workers in the labor market for clerks. What will happen to each of the following in equilibrium?
(i) The number of workers hired in the labor market for clerks. Explain.
(ii) The wage rate Lakshmi's Law Office will pay its clerks. Explain.

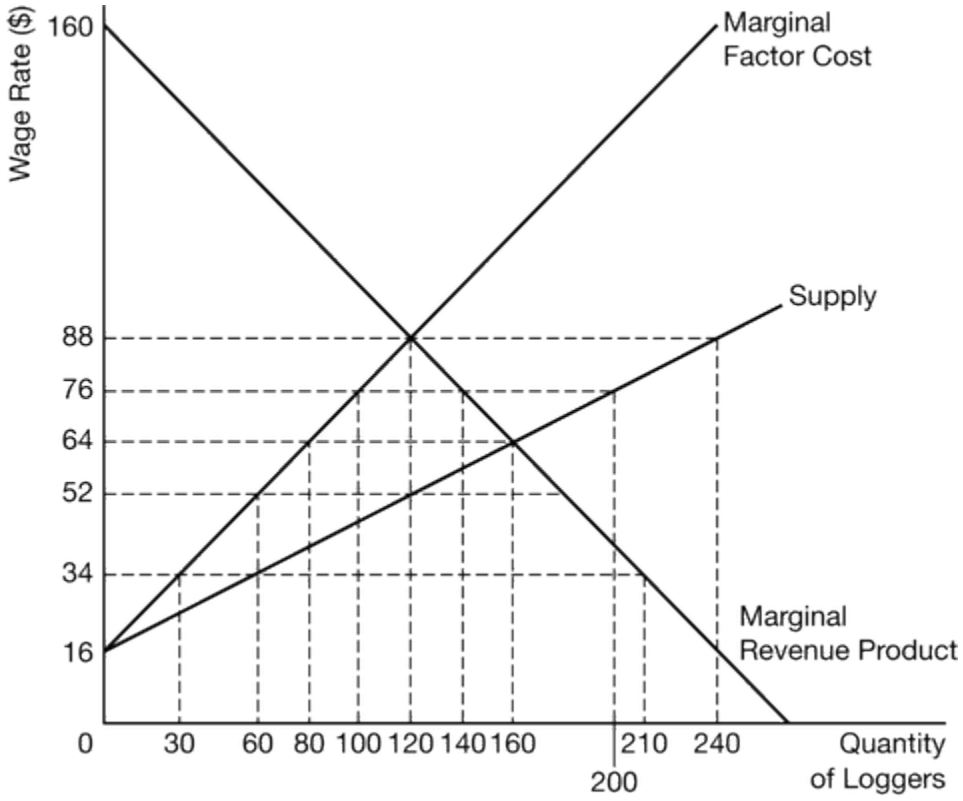
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24. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Larry's Logging is the only logging company in a small remote town, and Larry's Logging is the only employer of loggers in the area. The graph below shows the market for loggers with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) If the wage rate is $34, state whether there will be a shortage or a surplus of loggers and calculate its size. Show your work.

(b) Identify the profit-maximizing number of loggers that Larry's Logging will hire. Explain using the labeling on the graph.

(c) Identify the profit-maximizing wage rate that Larry's Logging will pay its loggers. Explain using the labeling on the graph.

(d) Assume that the market for loggers becomes perfectly competitive. What wage rate would Larry's Logging pay its loggers if it were a perfectly competitive firm? Explain using the labeling on the graph.

(e) Assume instead that Larry's Logging uses both labor and capital in its production of logs. The marginal product of the last unit of labor hired is 150 logs per hour and the marginal product of the last unit of capital rented is 200 logs per hour; the hourly wage rate for labor is $30 and the hourly rental price for capital is $50. To minimize the cost of producing its

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current level of output, should Larry's Logging hire more loggers, fewer loggers, or the same number of loggers? Explain using marginal analysis.

25. Respond to all parts of the question.

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.

Number of Workers	Output (dozens)
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?

26. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Malikah's Fashion Clothing.

Number of Garment Workers	Total Product per Hour
1	4
2	10
3	18
4	28
5	36
6	42
7	46
8	48

(a) After which garment worker do diminishing marginal returns begin for Malikah's Fashion Clothing? Explain using numbers.

(b) Assume Malikah's Fashion Clothing sells its clothes in a perfectly competitive market at a price of $8. Calculate the marginal revenue product of the fifth garment worker. Show your work.

(c) Malikah's Fashion Clothing hires garment workers in a perfectly competitive labor market for garment workers at a wage rate of $30 per hour, and the market price of clothes remains $8. How many garment workers will Malikah's Fashion Clothing hire to maximize its profit? Explain using marginal analysis.

(d) Assume the market price of clothes decreases as a result of a decrease in the number of consumers and Malikah's Fashion Clothing continues to operate. What will happen to each of the following?
(i) The marginal factor cost for Malikah's Fashion Clothing. Explain.
(ii) The marginal revenue product curve for Malikah's Fashion Clothing. Explain.

27. Respond to all parts of the question.

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Marginal analysis is essential to microeconomics decision making. Discuss how marginal analysis is used in each of the following cases.

a. To derive the supply curve for a perfectly competitive firm

b. To identify the least-cost combination of capital and labor used to produce a given level of output.

c. To regulate an industry that produces a product that generates negative externalities

28. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Mateo's Metalworks.

Number of Welders	Total Product per Hour
1	5
2	11
3	16
4	20
5	23
6	25
7	26
8	25

(a) Beginning with which welder do diminishing marginal returns set in for Mateo's Metalworks? Explain using numbers.

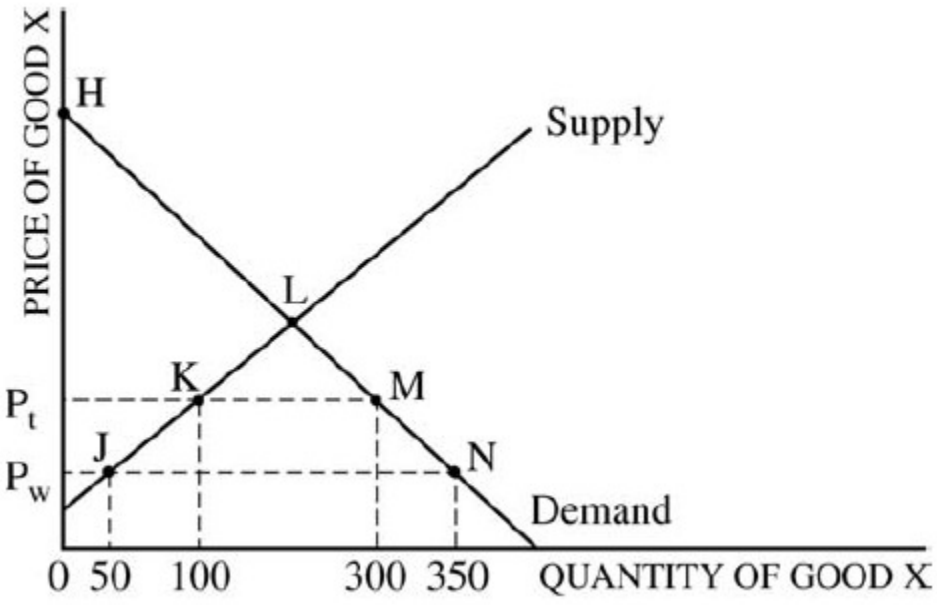
(b) Assume Mateo's Metalworks sells its welding services in a perfectly competitive market at a unit price of $10. Calculate the marginal revenue product of the seventh welder. Show your work.

(c) Mateo's Metalworks hires welders in a perfectly competitive labor market for welders at a wage rate of $35 per hour, and the market price of welding services remains $10. How many welders will Mateo's Metalworks hire to maximize its profit? Explain using marginal analysis.

(d) Assume there is an increase in the productivity of all workers in the labor market for welders. What will happen to each of the following in equilibrium?
(i) The number of workers hired in the labor market for welders. Explain.
(ii) The wage rate Mateo's Metalworks will pay its welders. Explain.

29. Respond to all parts of the question.

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The diagram above shows the domestic supply and demand for good X in the country of Placonia.

a. If the current world price of good X is P_w, does Placonia export or import good X? Explain.

b. Given your answer in part (a), indicate the quantity of good X that Placonia exports or imports.

c. Assume that the government of Placonia imposes a tariff on good X, increasing the price from P_w to P_t.

   Using the labels in the graph, indicate the change in each of the following in Placonia.

   i. Consumer surplus

   ii. Producer surplus

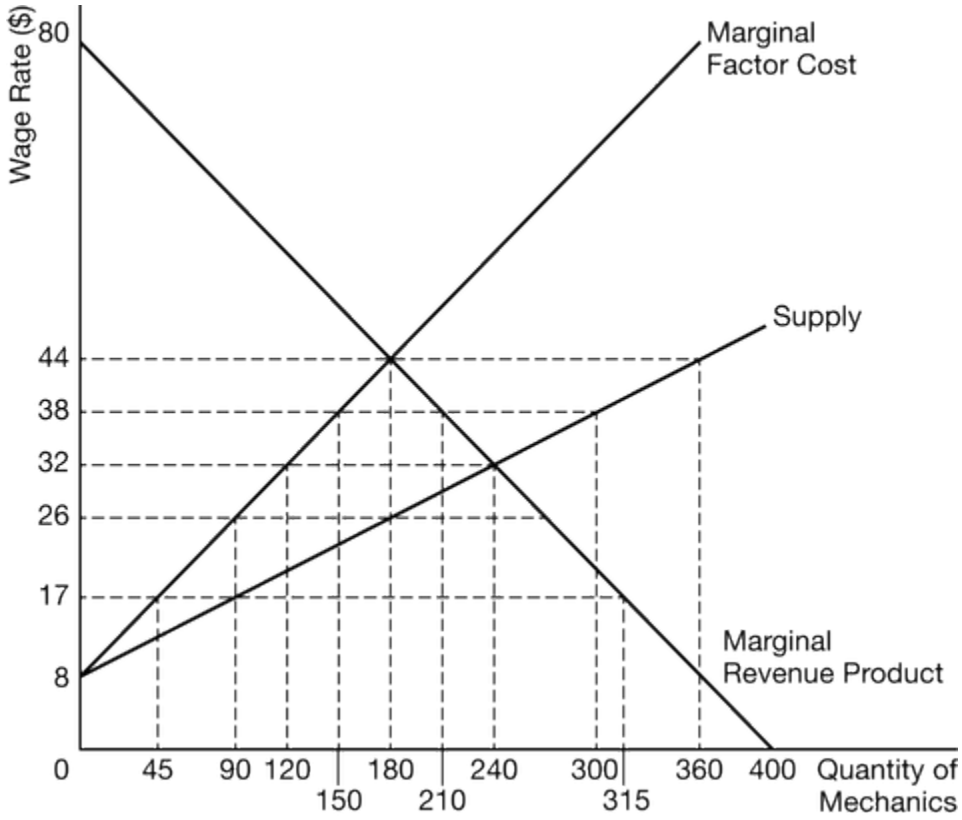
d. Indicate how employment in the domestic industry that produces good X is affected by the tariff.

30. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Molly's Motorcycles is the only motorcycle repair shop in a small remote town, and Molly's Motorcycles is the only employer of mechanics in the area. The graph below shows the market for mechanics with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) Identify the profit-maximizing number of mechanics that Molly's Motorcycles will hire. Explain using the labeling on the graph.

(b) Identify the profit-maximizing wage rate that Molly's Motorcycles will pay its mechanics. Explain using the labeling on the graph.

(c) If the wage rate is $38, state whether there will be a shortage or a surplus of mechanics and calculate its size. Show your work.

(d) If the marginal product of mechanics decreases, what will happen to the quantity of services provided by Molly's Motorcycles? Explain.

(e) Assume instead that Molly's Motorcycles uses both labor and capital in providing its services. The marginal product of the last unit of labor hired is 100 repairs per day and the marginal product of the last unit of capital rented is 60 repairs per

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day; the daily wage rate for labor is $20 and the daily rental price for capital is $30. To minimize the cost of providing its current level of service, should Molly's Motorcycles rent more capital, less capital, or the same amount of capital? Explain using marginal analysis.

31. Respond to all parts of the question.

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Gigantic Pharmaceutical Corporation has a patent on a prescription drug, making it the only manufacturer of that prescription drug. Gigantic is currently earning a positive economic profit.

(a) Draw a correctly labeled graph for Gigantic and show each of the following.

(i) The profit-maximizing quantity, labeled Q_G

(ii) The profit-maximizing price, labeled P_G

(iii) The average total cost curve, labeled ATC

(iv) The area representing the consumer surplus, shaded completely

(b) Suppose the demand for the prescription drug increases, and Gigantic hires its warehouse workers in a perfectly competitive labor market.

(i) What will happen to Gigantic's demand for warehouse workers? Explain.

(ii) What will happen to the wage rate Gigantic pays its warehouse workers and the number of warehouse workers it hires?

(c) After Gigantic's patent expires, another firm enters the prescription drug market and produces an identical drug that sells for a lower price.

(i) What will happen to Gigantic's producer surplus?

(ii) What will happen to the consumer surplus in this prescription drug market? Explain.

32. Respond to all parts of the question.

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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

a. In what kind of market structure does this firm sell its output? How can you tell?

b. In what kind of market structure does this firm hire its workers? How can you tell?

c. Calculate the marginal revenue product of the third worker. Show your work.

d. How many workers should the firm hire to maximize profit? Explain.

33. Respond to all parts of the question.

k

Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Avonni's Painting Company.

Number of Painters	Total Product per Hour
1	120
2	250
3	370
4	420
5	460
6	490
7	510
8	515

(a) Beginning with which painter do diminishing marginal returns set in for Avonni's Painting Company? Explain using numbers.

(b) Assume Avonni's Painting Company sells its painting services in a perfectly competitive market at a price of $3. Calculate the marginal revenue product of the second painter. Show your work.

(c) Avonni's Painting Company hires painters in a perfectly competitive labor market for painters at a wage rate of $140 per hour, and the market price of services remains $3. How many painters will Avonni's Painting Company hire to maximize its profit? Explain using marginal analysis.

(d) Assume painters must pay for a certification exam before they can work in this industry. If the cost of that exam increases, what will happen to each of the following in equilibrium?
(i) The market wage rate. Explain.
(ii) The number of workers hired in the labor market. Explain.

34. Respond to all parts of the question.

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Peaches and nectarines are substitute goods, and both are produced under conditions of competitive long-run equilibrium.

a. Joyce, a producer in the peach industry, discovers a technological breakthrough that only reduces the cost of producing peaches. Explain how the change in technology will affect each of the following for Joyce.

    i. Quantity of peaches produced

    ii. Price of peaches

    iii. Short-run profits

b. Now assume that all other peach-producing firms adopt the new technology. Explain how the adoption of the new technology will affect each of the following in the peach-producing industry.

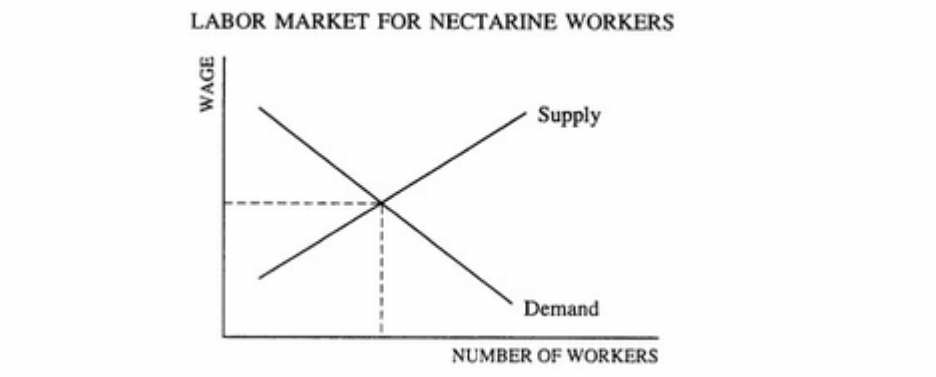
    i. Price of peaches

    ii. Quantity of peaches produced

c. This new technology is not applicable to the production of nectarines. Explain how the changes that occurred in the peach industry will affect each of the following in the nectarine industry.

    i. Price of nectarines

    ii. Quantity of nectarines



d. The graph above depicts the supply and demand curves for workers in the nectarine industry before the technological breakthrough in the peach industry.

    Explain how the technological breakthrough in the peach industry will affect each of the following in the labor market for nectarine workers.

    i. Wage rate for nectarine workers

    ii. Number of nectarine workers hired

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35. Respond to all parts of the question.

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.

36. Respond to all parts of the question.

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Petsall Corporation is a profit-maximizing monopolist. It sells a patented rabies vaccine for pets and earns economic profits.

a. Draw a correctly labeled graph that shows each of the following for Petsall.

    i. Output and price of the vaccine

    ii. Area of economic profits

b. Assume that Petsall hires its production workers in a perfectly competitive labor market at the wage rate of $20 per hour.

    i. State the marginal conditions for hiring the profit-maximizing amount of labor.

    ii. Draw a correctly labeled graph that shows the labor supply and demand curves for Petsall and indicate the profit-maximizing quantity of labor.

c. Suppose that the market wage rate now falls to $15 per hour. Show on your diagram in (b) (ii) how each of the following would be affected.

    i. The supply of labor to Petsall

    ii. The amount of labor Petsall would hire

d. Given the lower wage rate in (c), indicate how each of the following would change.

    i. Total fixed cost

    ii. Marginal cost

    iii. Price of the product

37. Respond to all parts of the question.

k

Include correctly labeled diagrams, if useful or required, in explaining your answer. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

On the Island of Gratin, potatoes are produced in a perfectly competitive constant cost industry. The market for potatoes is currently in long-run equilibrium at the market price of $5 per sac.

(a) Draw a correctly labeled graph for the potato market and for farmer Lamo, and show each of the following.

(i) The market equilibrium quantity and price, labeled Q_M and $5, respectively
(ii) The quantity produced and the price for farmer Lamo, labeled Q_L and $5, respectively

(b) Believing that the incomes of potato farmers are unfairly low, the government of Gratin imposes a binding price floor at $7 per sac. The government will purchase any surpluses of potatoes. On your graph in part (a) show the following.

(i) The market quantity of potatoes that would be supplied at the price floor, labeled Q_F
(ii) The profit farmer Lamo earns, shaded completely

(c) If the absolute value of the price elasticity of demand is 0.92, would consumer spending on potatoes increase, decrease, or stay the same as a result of the price floor? Explain.

(d) How would the price floor affect the demand for labor by potato farmers?

(e) Potatoes, corn, and rice are all produced on the island of Gratin in perfectly competitive markets.

(i) Assume corn is a substitute in production (an alternate output) for potatoes. How would setting the price floor on potatoes affect the equilibrium price and quantity of corn? Explain.
(ii) As a result of an increase in the price of rice, the demand for potatoes increased. Are rice and potatoes substitutes or complements in consumption?

38. Respond to all parts of the question:

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Pride Textiles produces and sells towels in a perfectly competitive market. Pride Textiles hires its workers in a perfectly competitive labor market. Assume that the market wage rate for workers is $80 per day.

a. State the conditions necessary for hiring the profit-maximizing amount of labor.

b. At the profit-maximizing level of output, suppose that the marginal product of the last worker hired is 20 towels per day. Calculate the price of a towel.

c. Draw a correctly labeled graph of the labor supply and demand curves for Pride Textiles, and show the equilibrium amount of labor hired.

d. Given your answer to part (b), if the price of a towel increases, explain how Pride's profit-maximizing quantity of labor will be affected.

39. Respond to all parts of the question.

k

In answering the question, you should emphasize the line of reasoning that generated your results; it is not enough to list the results of your analysis. Include diagrams, if useful or required, in explaining your answers. All diagrams should be clearly labeled.

Workers	Output
3	60
4	80
5	105
6	125
7	140
8	150

The table above describes the production function for John Jones's T-shirt firm. Jones can hire as many workers as he wants for $75 per day and can sell as many T-shirts as he wants for $5 each.

a. Given the production information above, do each of the following.

   i. Draw a graph showing this firm's demand and supply curves for workers.

   ii. Explain how Jones will determine the number of workers to hire.

   iii. Indicate how many workers Jones will hire.

b. Assume the wage rate at which Jones can hire all the workers he wants increases to $120 per day, and the selling price of T-shirts increases to $6. Do each of the following.

   i. Explain how the demand for workers will change.

   ii. Indicate how many workers Jones will hire.

   iii. Indicate the quantity of T-shirts Jones will produce.

c. In which type of market structure does Jones sell his T-shirts? Explain how you know.

40. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Raydisha's Radiology Clinic.

Number of Radiologists	Total Product per Hour
1	30
2	58
3	80
4	99
5	112
6	122
7	125
8	123

(a) After which radiologist do diminishing marginal returns begin for Raydisha's Radiology Clinic? Explain using numbers.

(b) Assume Raydisha's Radiology Clinic sells its radiological services in a perfectly competitive market at a unit price of $10. Calculate the marginal revenue product of the seventh radiologist. Show your work.

(c) Raydisha's Radiology Clinic hires radiologists in a perfectly competitive labor market for radiologists at a wage rate of $120 per hour, and the market price of radiological services remains $10. How many radiologists will Raydisha's Radiology Clinic hire to maximize its profit? Explain using marginal analysis.

(d) Assume there is a decrease in the demand for radiological services in the market and Raydisha's Radiology Clinic continues to operate. What will happen to each of the following?
(i) The market wage rate. Explain.
(ii) The marginal revenue product curve for Raydisha's Radiology Clinic. Explain.

41. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Number of Workers	Number of Parked Cars
0	0
1	8
2	20
3	34
4	45
5	54
6	60
7	63

Assume that Schmitt Inc. provides car parking services in a perfectly competitive output market and hires labor in a perfectly competitive input market. The market price per car parked is $10, the daily market wage per worker is $100, and fixed costs are $50 per day. The table above shows the number of workers required to park different quantities of cars per day.

(a) Calculate the marginal revenue product of the second worker. Show your work.

(b) How many workers will Schmitt Inc. hire to maximize profit? Relative to this number of hired workers, explain why Schmitt Inc. will not hire one additional worker. Your answer must use marginal analysis and numbers from the table.

(c) Calculate the daily profit for Schmitt Inc. at the profit-maximizing quantity identified in part (b).
Show your work.

(d) Suppose new legislation requires each worker in the parking industry to purchase an individual insurance policy at the worker's expense in order to legally park cars.

(i) Will the market wage paid by a typical firm in this industry increase, decrease, or stay the same in the long run?
(ii) For a typical firm in the industry, will the number of workers hired in the short run increase, decrease, or stay the same? Explain.

42. Respond to all parts of the question:

k

Sparkle Car Wash is a profit-maximizing firm with the following production information.

Number of Workers	Number of Cars Washed per Day
0	0
1	15
2	35
3	60
4	75
5	85
6	80

a. With which worker is marginal product maximized?

b. Identify and define the economic principle that explains why marginal product eventually decreases.

c. Explain why Sparkle would never hire the sixth worker.

d. If Sparkle charges $6 for washing a car, what is the maximum daily wage that Sparkle would be willing to pay the fourth worker?

43. Respond to all parts of the question.

k

Assume that a firm produces output using one fixed input, capital, and one variable input, labor. The firm can sell all of the output it produces at a market price of $3 each, can hire all of the workers it wants at a market wage rate $11 each, and has fixed costs of $10. It faces the following production schedule.

Number of Employees	Total Output
0	0
1	14
2	26
3	35
4	42
5	46
6	48

a. In what kind of market structure does this firm sell its output? How can you tell?

b. In what kind of market structure does this firm hire its employees? How can you tell?

c. Using marginal revenue product analysis, how many employees should this firm hire to maximize short-run profits? How can you determine that?

d. Based on your answer in part (c), how many units of output will this firm produce?

e. At the level of output you identified in part (d), is the firm earning an economic profit, a normal profit, or suffering a loss? How can you tell?

44. Respond to all parts of the question.

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

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.

a. Calculate the marginal (physical) product of the third worker.

b. Define the law of diminishing marginal returns and explain why it occurs.

c. Diminishing marginal returns first occur with the hiring of which worker for the firm?

d. What is the highest daily wage that the firm is willing to pay to hire the fifth worker?

e. What will happen to the demand for labor if the market price of the product increases? Explain.

Respond to all parts of the question.

45.

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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

46. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Todd's Trucking Company.

Number of Drivers	Total Product per Hour
1	8
2	18
3	30
4	50
5	60
6	65
7	67
8	65

(a) Beginning with which driver do diminishing marginal returns set in for Todd's Trucking Company? Explain using numbers.

(b) Assume Todd's Trucking Company sells its trucking services in a perfectly competitive market at a price of $6. Calculate the marginal revenue product of the third driver. Show your work.

(c) Todd's Trucking Company hires drivers in a perfectly competitive labor market for drivers at a wage rate of $40 per hour, and the market price of services remains $6. How many drivers will Todd's Trucking Company hire to maximize its profit? Explain using marginal analysis.

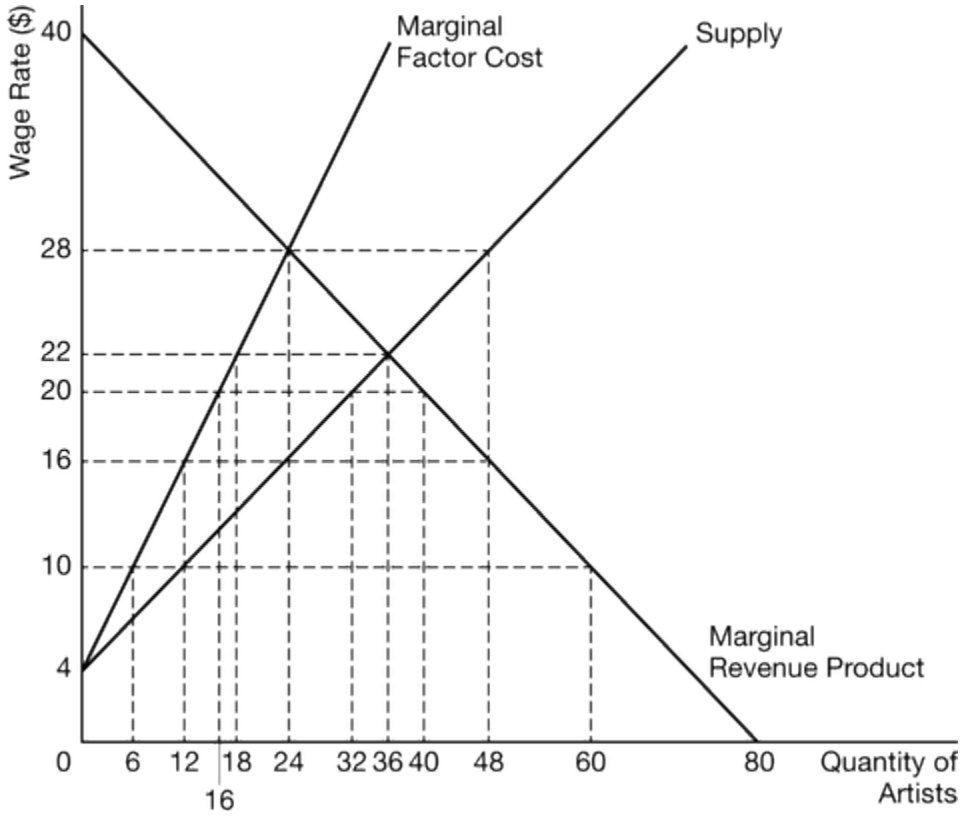
(d) Assume drivers must pay for a certification exam before they can work in this industry. If the cost of that exam decreases, what will happen to each of the following in equilibrium?
(i) The market wage rate. Explain.
(ii) The number of workers hired in the labor market. Explain.

47. Respond to all parts of the question.

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***Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clea*rly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.**

Tandy's Art is the only art studio and workshop in a small remote town, and Tandy's Art is the only employer of artists in the area. The graph below shows the market for artists with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) Identify the profit-maximizing number of artists that Tandy's Art will hire. Explain using the labeling on the graph.

(b) Identify the profit-maximizing wage rate that Tandy's Art will pay its artists. Explain using the labeling on the graph.

(c) If the wage rate is $10, state whether there will be a shortage or a surplus of artists and calculate its size. Show your work.

(d) Assume that the market for artists becomes perfectly competitive. What wage rate would Tandy's Art pay its artists if it were a perfectly competitive firm? Explain using labeling on the graph.

(e) Assume instead that Tandy's Art uses both labor and capital in its production of artwork. The marginal product of the last unit of labor hired is 90 pieces of artwork per day and the marginal product of the last unit of capital rented is 80 pieces of artwork per day; the daily wage rate for labor is $10 and the daily rental price for capital is $20. To minimize the cost of providing its current level of output, should Tandy's Art hire more artists, fewer artists, or the same number of

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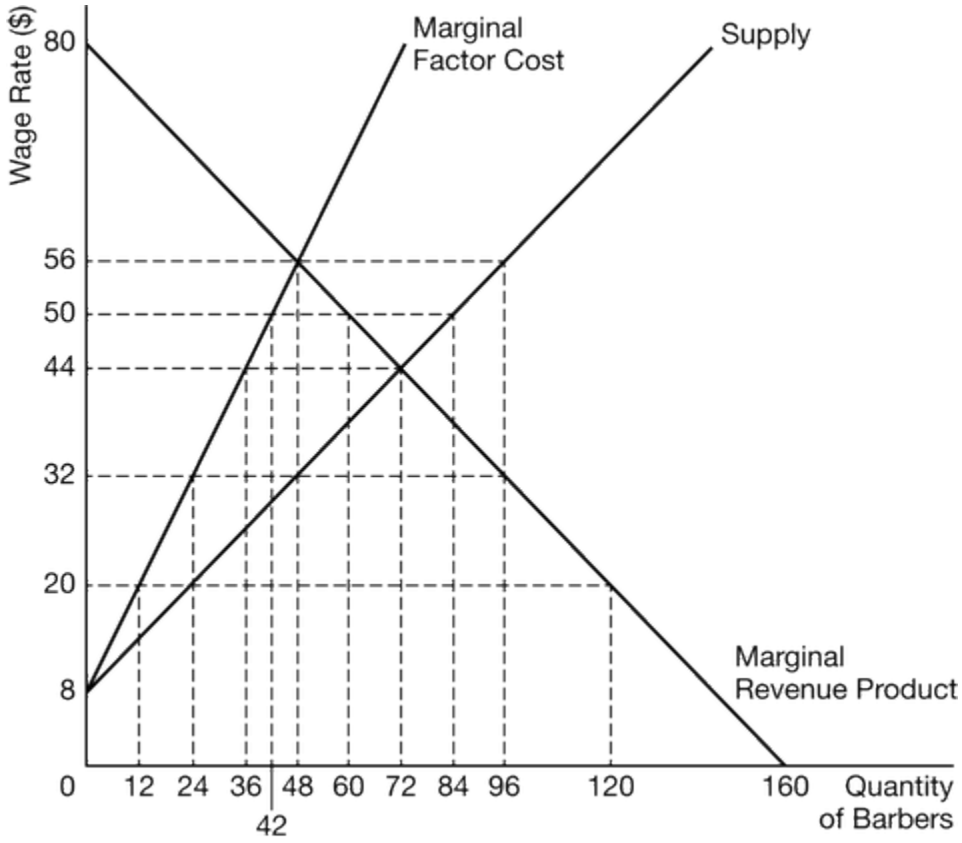
artists? Explain using marginal analysis.

48. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Tom's Trims is the only barber shop in a small remote town, and Tom's Trims is the only employer of barbers in the area. The graph below shows the market for barbers with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) If the wage rate is $20, state whether there will be a shortage or a surplus of barbers and calculate its size. Show your work.

(b) Identify the profit-maximizing number of barbers that Tom's Trims will hire. Explain using the labeling on the graph.

(c) Identify the profit-maximizing wage rate that Tom's Trims will pay its barbers. Explain using the labeling on the graph.

(d) Assume that the market for barbers becomes perfectly competitive. What wage rate would Tom's Trims pay its barbers if it were a perfectly competitive firm? Explain using labeling on the graph.

(e) Assume instead that Tom's Trims uses both labor and capital in providing its services. The marginal product of the last unit of labor hired is 80 cuts per day and the marginal product of the last unit of capital rented is 120 cuts per day; the

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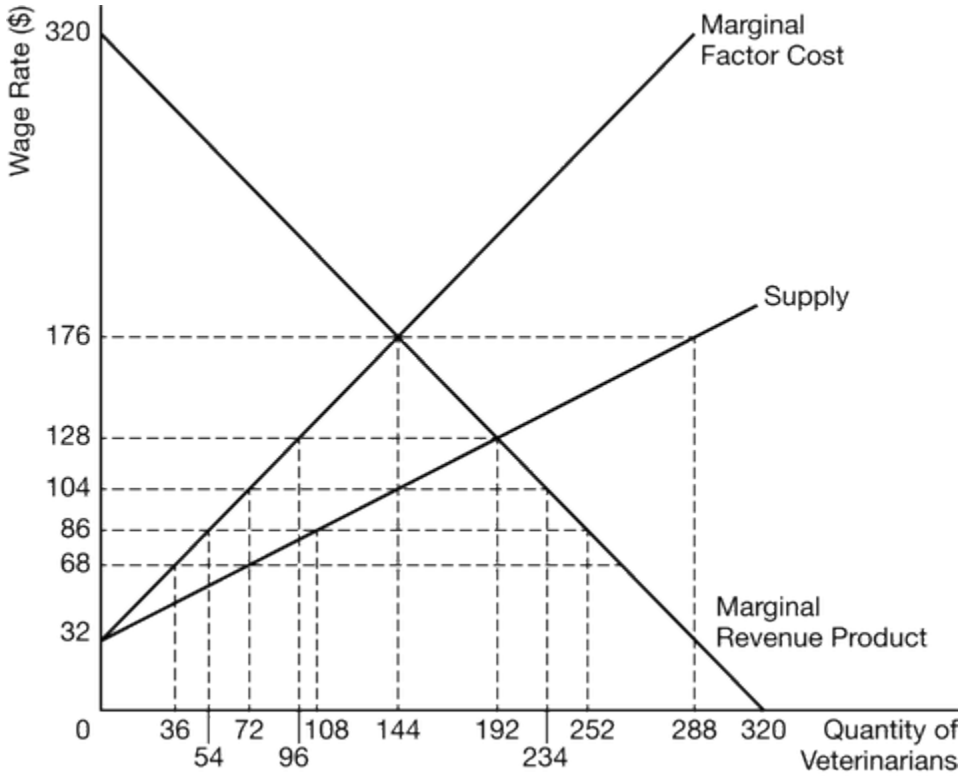
daily wage rate for labor is $20 and the daily rental price for capital is $40. To minimize the cost of producing its current level of output, should Tom's Trims hire more barbers, fewer barbers, or the same number of barbers? Explain using marginal analysis.

49. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

Vijay's Veterinary is the only animal care facility in a small remote town, and Vijay's Veterinary is the only employer of veterinarians in the area. The graph below shows the market for veterinarians with the marginal factor (resource) cost curve, the labor supply curve, and the marginal revenue product curve.



(a) Identify the profit-maximizing number of veterinarians that Vijay's Veterinary will hire. Explain using the labeling on the graph.

(b) Identify the profit-maximizing wage rate that Vijay's Veterinary will pay its veterinarians. Explain using the labeling on the graph.

(c) If the wage rate is $86, state whether there will be a shortage or a surplus of veterinarians and calculate its size. Show your work.

(d) If the marginal product of veterinarians decreases, what will happen to the quantity of services provided by Vijay's Veterinary? Explain.

(e) Assume instead that Vijay's Veterinary uses both labor and capital in providing its services. The marginal product of the last unit of labor hired is 50 patients per day and the marginal product of the last unit of capital rented is 10 patients per day; the daily wage rate for labor is $100 and the daily rental price for capital is $40. To minimize the cost of

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providing its current level of service, should Vijay's Veterinary rent more capital, less capital, or the same amount of capital? Explain using marginal analysis.

50. Respond to all parts of the question.

***Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly la*beled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.**

The table below shows the short-run production function for Zhizhi's Bakery.

Number of Bakers	Total Product per Hour
1	9
2	19
3	28
4	36
5	43
6	49
7	53
8	52

(a) After which baker do diminishing marginal returns begin for Zhizhi's Bakery? Explain using numbers.

(b) Assume Zhizhi's Bakery sells its baked goods in a perfectly competitive market at a price of $5 per unit. Calculate the marginal revenue product of the fifth baker. Show your work.

(c) Zhizhi's Bakery hires bakers in a perfectly competitive labor market for bakers at a wage rate of $36 per hour, and the market price of baked goods remains $5. How many bakers will Zhizhi's Bakery hire to maximize its profit? Explain using marginal analysis.

(d) Assume there is an increase in the demand for baked goods in the market. What will happen to each of the following?
(i) The market wage rate. Explain.
(ii) The marginal revenue product curve for Zhizhi's Bakery. Explain.

51. Respond to all parts of the question.

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Include correctly labeled diagrams, if useful or required, in explaining your answers. A correctly labeled diagram must have all axes and curves clearly labeled and must show directional changes. If the question prompts you to "Calculate," you must show how you arrived at your final answer.

The table below shows the short-run production function for Chloe's Plumbing Services.

Number of Plumbers	Total Product per Hour
1	8
2	16
3	26
4	37
5	50
6	60
7	68
8	74

(a) After which plumber do diminishing marginal returns begin for Chloe's Plumbing Services? Explain using numbers.

(b) Assume Chloe's Plumbing Services sells its plumbing services in a perfectly competitive market at a unit price of $15. Calculate the marginal revenue product of the third plumber. Show your work.

(c) Chloe's Plumbing Services hires plumbers in a perfectly competitive labor market for plumbers at a wage rate of $115 per hour, and the market price of plumbing services remains $15. How many plumbers will Chloe's Plumbing Services hire to maximize its profit? Explain using marginal analysis.

(d) Assume plumbers and plumbing equipment are substitutes in providing plumbing services by all plumbing firms in the market. If plumbing equipment, a fixed input, becomes less expensive and Chloe's Plumbing Services provides the same quantity of plumbing services, will each of the following increase, decrease, or stay the same?
(i) The wage rate Chloe's Plumbing Services will pay its plumbers. Explain.
(ii) The demand curve for plumbers for Chloe's Plumbing Services. Explain.

52. Respond to all parts of the question.