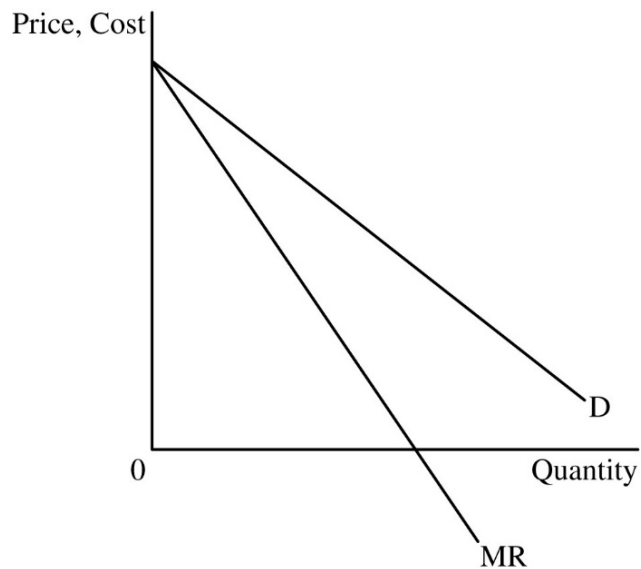
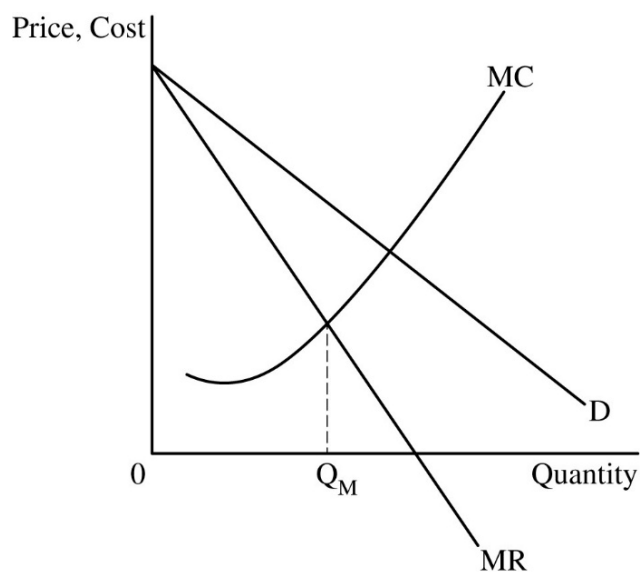


Question 1: Long**10 points**

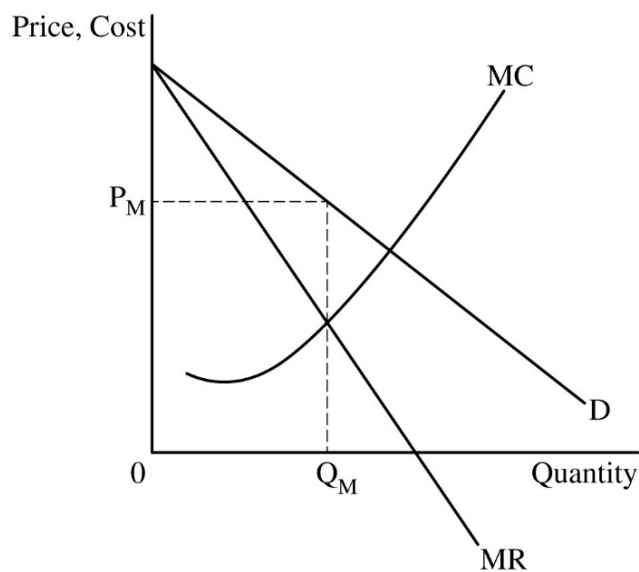
- A** Draw a correctly labeled graph for Voda Reservoir with a downward-sloping demand (D) curve and a downward-sloping marginal revenue (MR) curve with the MR curve below the D curve. **1 point**
- Point 1



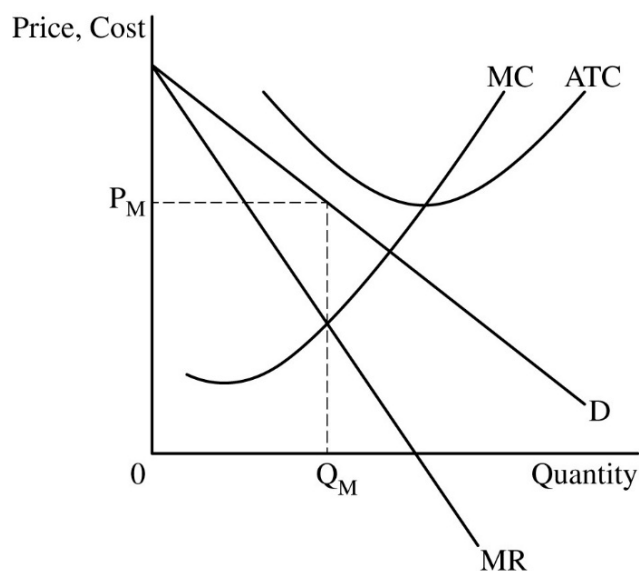
- Point 2 The graph must show a rising marginal cost (MC) curve and the profit-maximizing quantity, labeled Q_M , where $MR = MC$. **1 point**



- Point 3 The graph must show the profit-maximizing price, labeled P_M , from the D curve at Q_M . **1 point**

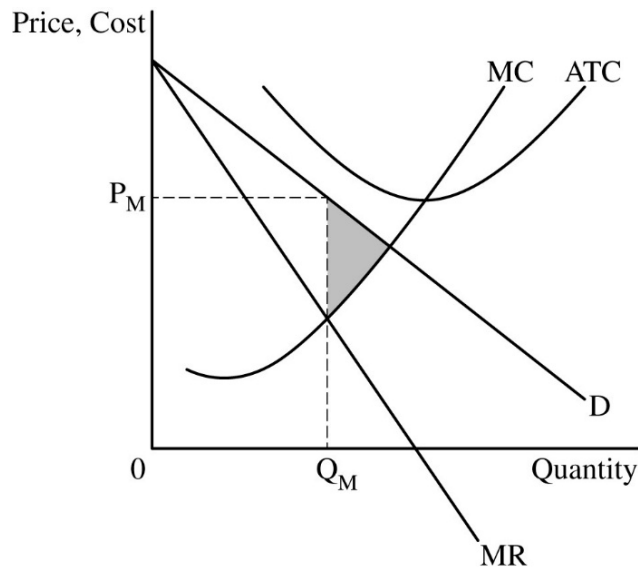


- Point 4 The graph must show the average total cost (ATC) curve above the D curve and show the MC curve passing through the minimum point of the ATC curve. **1 point**



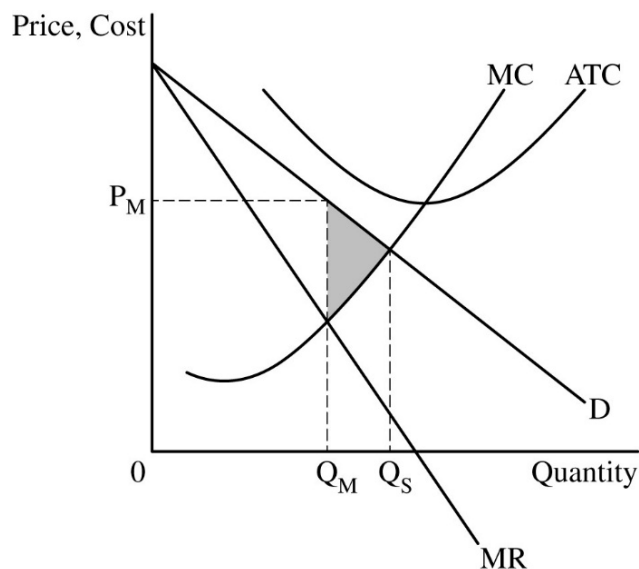
Point 5 The graph must show the area of deadweight loss, shaded completely.

1 point



B The graph from part A must show the socially optimal quantity of bottled water, labeled Q_S , from the intersection of the D and MC curves.

1 point



C State that Voda Reservoir's profit-maximizing quantity of bottled water will increase and explain with **ONE** of the following:

1 point

Point 7

- The per-unit subsidy decreases the firm's marginal cost, which shifts the MC curve to the right (down), intersecting the MR curve at a greater quantity.
- The per-unit subsidy increases the firm's marginal revenue, which shifts the MR curve to the right, intersecting the MC curve at a greater quantity.

D State that the demand for Voda Reservoir's bottled water will become more elastic.

1 point

Point 8

- | | | | |
|----------|-------------|---|----------------|
| E | (i) | State that Voda Reservoir's demand for labor will increase and explain that the increase in demand for bottled water will increase the price and marginal revenue of bottled water, increasing the marginal revenue product of labor. | 1 point |
| Point 9 | | | |
| | (ii) | State that the market wage will increase in the short run and explain that the new regulation will decrease the supply of workers. | 1 point |
| Point 10 | | | |

Question 2: Short**5 points**

- | | | |
|------------|--|----------------|
| (a) | Calculate the average fixed cost of \$3 and show the work. | 1 point |
|------------|--|----------------|

$$\text{Average Fixed Cost} = \frac{\text{Total Fixed Cost}}{\text{Quantity of Output}}$$

$$\text{Average Fixed Cost} = \frac{\$90}{30} = \$3$$

- | | | |
|------------|---|----------------|
| (b) | Calculate the marginal cost as \$6 and show the work. | 1 point |
|------------|---|----------------|

$$\text{Marginal Cost} = \frac{\text{Change in Total Variable Cost}}{\text{Change in Output}}$$

$$\text{Marginal Cost} = \frac{(\$108 - \$90)}{(30 - 27)} = \frac{\$18}{3} = \$6$$

OR

$$\text{Marginal Cost} = \frac{\text{Change in Total Cost}}{\text{Change in Output}}$$

$$\text{Marginal Cost} = \frac{(\$198 - \$180)}{(30 - 27)} = \frac{\$18}{3} = \$6$$

- | | | |
|------------|---|----------------|
| (c) | State that diminishing marginal returns to labor begin with the hiring of the 3 rd worker and explain that the marginal product of the 1 st worker is 5 bags, the marginal product of the 2 nd worker increases to 7 bags, and the marginal product of the 3 rd worker decreases to 6 bags. | 1 point |
|------------|---|----------------|

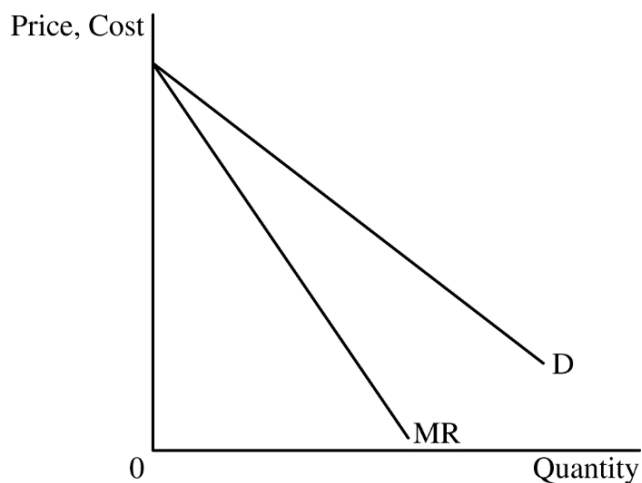
- | | | |
|------------|--|----------------|
| (d) | State that the profit-maximizing number of workers is 7 and explain that the marginal revenue product (MRP) of the 7 th worker (\$20) is greater than the marginal factor cost (MFC) of the 7 th worker (wage = \$18), and that the hiring of the 8 th worker would decrease profits because the MRP of the 8 th worker (\$10) is less than the MFC of the 8 th worker (wage = \$18). | 1 point |
|------------|--|----------------|

- | | | |
|------------|--|----------------|
| (e) | State that Gato Food will experience diseconomies of scale and explain that as output increases from 40 to 50 units, long-run average total cost increases from \$15 to \$18 per unit. | 1 point |
|------------|--|----------------|

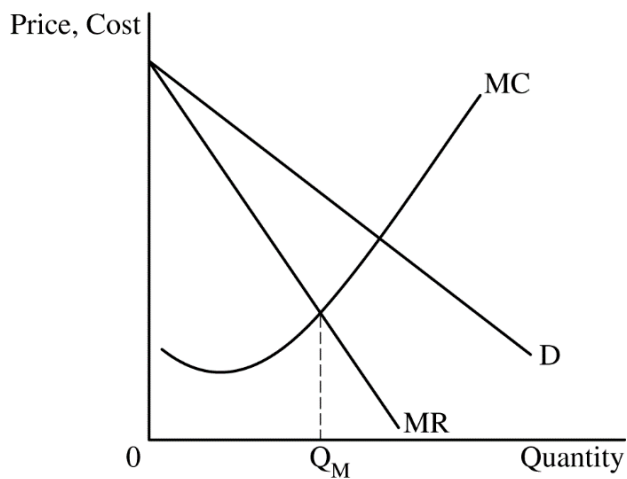
Total for question 2 5 points

Question 1: Long**10 points**

- (a) Draw a correctly labeled graph of a monopoly with a downward-sloping demand (D) curve and a downward-sloping marginal revenue (MR) curve with the MR curve below the D curve. **1 point**

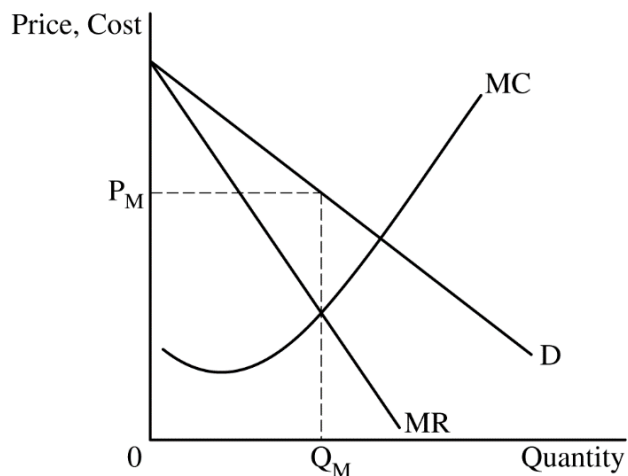


- For the second point, the graph must show a marginal cost (MC) curve and the profit-maximizing quantity, labeled Q_M , where $MR = MC$. **1 point**



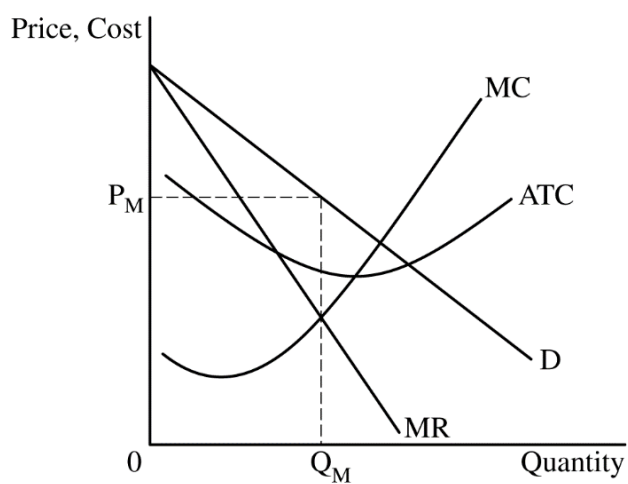
For the third point, the graph must show the profit-maximizing price, labeled P_M , from the demand curve at Q_M .

1 point



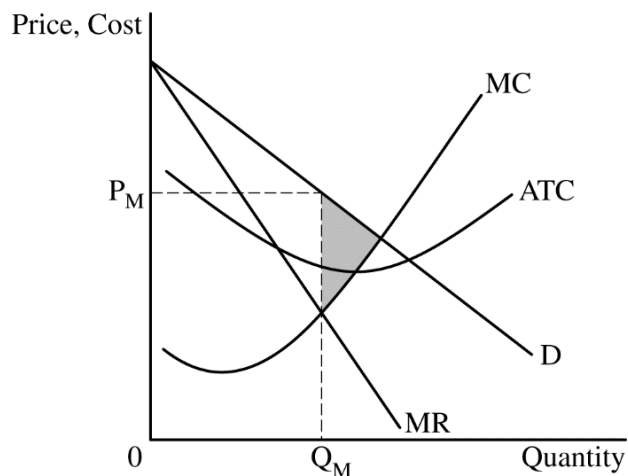
For the fourth point, the graph must show the average total cost (ATC) curve below P_M at Q_M and the MC curve passing through the minimum point of the ATC curve.

1 point



For the fifth point, the graph must show the area of the deadweight loss, shaded completely.

1 point

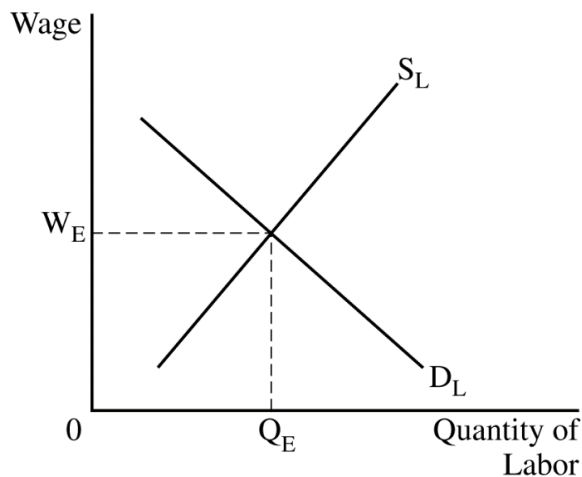


Total for part (a)

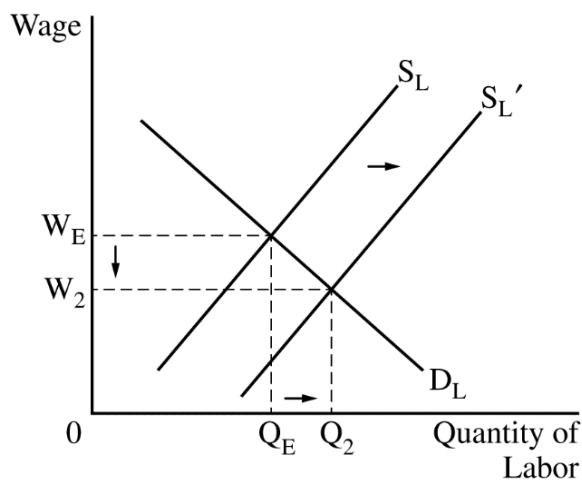
5 points

- | | | |
|------------|---|----------------|
| (b) | State that the government would impose a binding price ceiling. | 1 point |
| (c) | State that the profit-maximizing quantity will decrease and explain that the demand for the device will decrease, causing the MR curve to shift to the left, intersecting the MC curve at a lower quantity. | 1 point |

- (d)(i)** Draw a correctly labeled graph of a perfectly competitive labor market with a downward-sloping demand (D) curve and an upward-sloping supply (S) curve and show the equilibrium wage and quantity of labor, labeled W_E and Q_E , respectively.

1 point

- (d)(ii)** The graph from part (d)(i) must show a rightward shift in the labor supply curve, resulting in a lower equilibrium wage rate, labeled W_2 , and a higher equilibrium quantity of labor, labeled Q_2 .

1 point

- (d)(iii)** Calculate the wage rate as \$200 and show your work.

1 point

$$\frac{\text{Marginal Product of Capital}}{\text{Rental Price}} = \frac{\text{Marginal Product of Labor}}{\text{Wage Rate}}$$

$$\frac{2,500}{\$500} = \frac{1,000}{\text{Wage Rate}}$$

$$\text{Wage Rate} = \$200$$

Total for part (d) 3 points**Total for question 1 10 points**

Question 2: Short**5 points**

- (a) Calculate the marginal revenue product (MRP) of the 2nd worker as \$55 and show your work. **1 point**

$$\begin{aligned}\text{MRP}_{(2\text{nd worker})} &= (\text{Marginal Product} \times \text{Marginal Revenue}) \\ &= (20 - 9) \times \$5 = 11 \times \$5 = \$55\end{aligned}$$

- (b) State that diminishing marginal returns will begin with the hiring of the 3rd worker. **1 point**

- (c) State that the profit-maximizing number of workers is 4 and explain that the MRP of the 4th worker (\$25) is greater than the marginal factor cost (MFC) of the 4th worker (wage = \$15), and that the hiring of the 5th worker would decrease profits because the MRP (\$10) is less than the MFC of the 5th worker (\$15). **1 point**

- (d) Calculate the economic profit as \$60 and show your work. **1 point**

$$\text{Economic Profit} = \text{Total Revenue} - \text{Total Cost}$$

$$\text{Economic Profit} = \text{Total Revenue} - \text{Total Fixed Cost} - \text{Total Variable Cost}$$

$$\begin{aligned}\text{Economic Profit} &= (\$5 \times 32) - \$40 - (\$15 \times 4) \\ &= \$160 - \$40 - \$60 = \$160 - \$100 = \$60\end{aligned}$$

- (e) State that the number of workers hired will stay the same and explain that the increase in fixed cost does not affect the marginal factor cost of producing rain jackets. **1 point**

Total for question 2 5 points

Question 2: Short**5 points**

(a)	State that there is a positive consumption externality.	1 point
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(b)	State that the marginal external benefit is \$3.	1 point
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(c) (i)	State that the change in profit per hour for Bueno is \$10 and show your work.	1 point
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Change in Profit per Hour

$$\text{= Marginal Revenue Product (MRP) – Marginal Factor Cost (MFC)}$$

$$\text{= } (\$5 \times 6) - \$20 = \$30 - \$20 = \$10$$

(ii)	State that Bueno's MRP curve would shift up (or to the right) and explain that the subsidy would increase the demand for guava and increase the price paid by buyers, which would increase MRP for each worker and shift the curve to the right.	1 point
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Total for part (c)		2 points
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(d)	State that the number of workers hired will decrease as the quantity of labor hired will occur at a lower quantity of labor where $MFC=MRP$ and explain with ONE of the following:	1 point
------------	---	----------------

- The MFC for a monopsony is greater than the MFC for a perfectly competitive labor market.
- The MFC increases as the monopsony pays higher wages for every worker as it hires more workers whereas the MFC (or wage) is constant for a firm in a perfectly competitive labor market.

Total for question 2		5 points
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Question 2: Short**5 Points**

- (a) Calculate the marginal revenue product of the second worker as \$120 and show your work. **1 point**

$$\text{Marginal Revenue Product} = (20 - 8) / (2 - 1) \times \$10 \text{ or } (\$200 - \$80) / (2 - 1) = \$120$$

- (b) State that Schmitt Inc. will hire 4 workers and explain that Schmitt will not hire the 5th worker because the marginal revenue product of the 5th worker is \$90 $((54 - 45) \times \$10)$ which is less than the wage of \$100. **1 point**

- (c) Calculate Schmitt's daily profit as \$0 and show your work. **1 point**

$$\text{Profit} = (TR - TC) = (\$10 \times 45) - (\$50 + (4 \times \$100)) = \$450 - \$450 = \$0$$

- (d) (i) State that the wage will increase. **1 point**

- (ii) State that the number of workers employed by a typical firm will decrease and explain that the market supply of workers will decrease, which causes the marginal factor cost (marginal resource cost) to increase, leading to a lower quantity of workers for the typical firm where $MRP = MFC$. **1 point**

Total for part (d) 2 points**Total for question 2 5 points****2019****AP[®]****CollegeBoard**

AP[®] Microeconomics

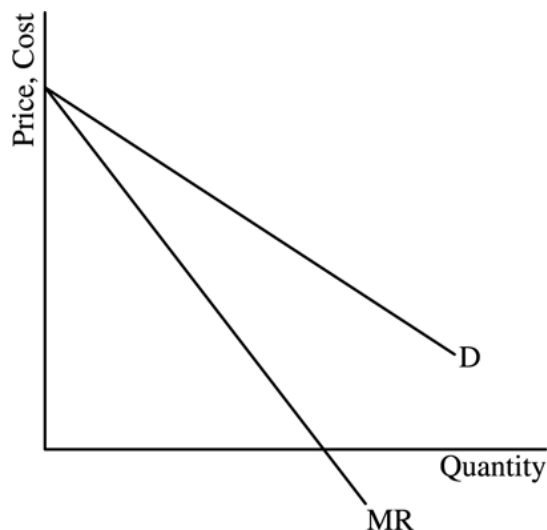
Scoring Guidelines

Set 2

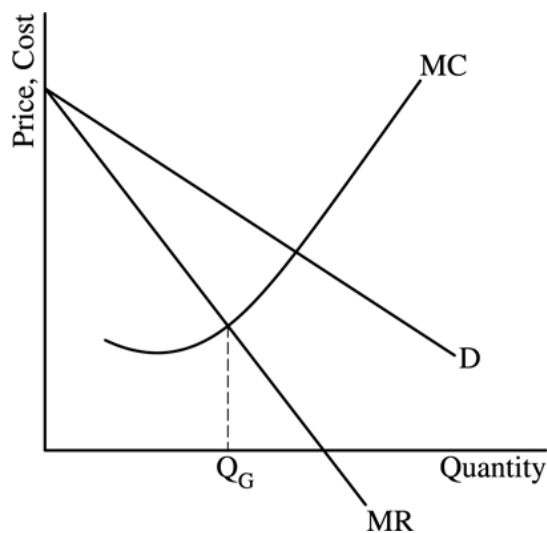
2019 SCORING GUIDELINES**Question 1****9 points (5 + 2 + 2)**

(a) 5 points

- One point is earned for drawing a correctly labeled graph of the monopoly showing downward-sloping demand (D) and marginal revenue (MR) curves with the MR curve below the demand curve.

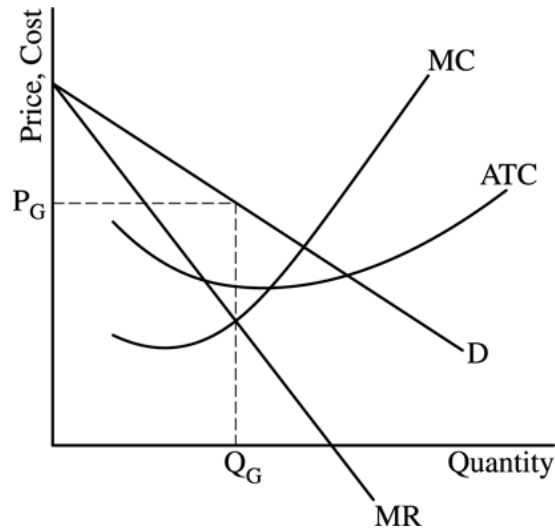


- One point is earned for showing the profit-maximizing quantity, labeled Q_G , where $MR=MC$.

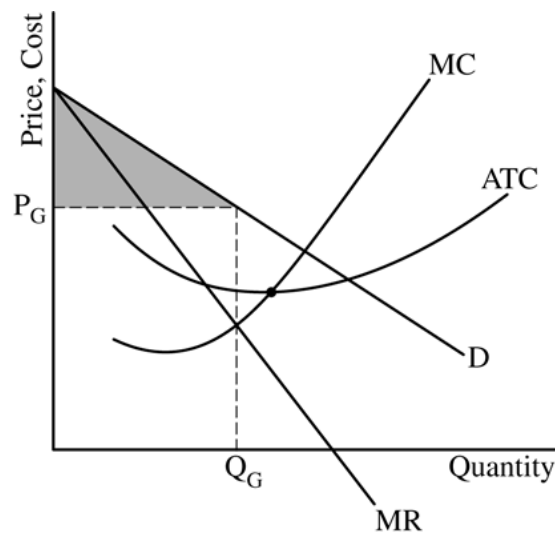


2019 SCORING GUIDELINES**Question 1 (continued)**

- One point is earned for both showing the profit-maximizing price, labeled P_G , from the demand curve at Q_G , and above the average total cost (ATC) curve.
- One point is earned for showing the marginal cost (MC) curve rising and passing through the minimum point of the ATC curve.



- One point is earned for completely shading the area of the consumer surplus.



2019 SCORING GUIDELINES**Question 1 (continued)**

(b) 2 points

- One point is earned for stating that Gigantic Pharmaceutical Corporation's demand for warehouse workers will increase and for explaining that the marginal revenue product of labor increases because of the increase in the product price.
- One point is earned for stating that the wage rate Gigantic pays to its warehouse workers will not change and the number of workers hired will increase.

(c) 2 points

- One point is earned for stating that Gigantic's producer surplus will decrease.
- One point is earned for stating that the consumer surplus will increase and for explaining that because of the increased competition the price will decrease and the quantity will increase.

2019 SCORING GUIDELINES**Question 2****5 points (2 + 2 + 1)**

(a) 2 points

- One point is earned for identifying the after-tax price paid by consumers as P_3 and the after-tax quantity as Q_2 .
- One point is earned for identifying the area representing the total tax revenue as:
 P_1P_3SZ , or
 $(P_3 \times Q_2) - (P_1 \times Q_2)$, or
 $(P_3 - P_1) \times Q_2$

(b) 2 points

- One point is earned for stating that the price paid by consumers will be higher.
- One point is earned for stating that the tax revenue received by the government will be higher because the tax does not reduce the quantity purchased when the demand is perfectly inelastic, while the quantity does fall when demand is downward sloping (i.e., $Q_3 > Q_2$).

(c) 1 point

- One point is earned for stating that the producer surplus will stay the same, and for explaining that this is because both the price received by sellers (P_2) and the quantity sold (Q_3) do not change. It is also acceptable to explain that producer surplus stays the same because the consumer bears the full burden of the tax.

2019 SCORING GUIDELINES**Question 3****6 points (1 + 1 + 1 + 1 + 2)**

(a) 1 point

- One point earned for stating that Jackpot Florist's dominant strategy is to close at 6 p.m.

(b) 1 point

- One point is earned for stating that this is not the profit-maximizing action by Boulevard Gardens and for explaining that Boulevard will earn \$30 by choosing Delivery instead of \$20 choosing No Delivery.

(c) 1 point

- One point is earned for identifying the profit for Boulevard Gardens in the Nash equilibrium as \$30.

(d) 1 point

- One point is earned for stating that they would choose to close at 9 p.m. and offer No Delivery.

(e) 2 points

- One point is earned for redrawing the payoff matrix showing the effect of the agreement.

		Boulevard	
		Delivery	No Delivery
Jackpot	6 p.m.	\$35,\$30	\$43,\$32
	9 p.m.	\$37,\$38	\$45,\$40

- One point is earned for stating that Boulevard will agree to Jackpot's proposal and for explaining that Boulevard will be better off because this will increase the payoff from \$30 to \$40.

2018**AP[®]** **CollegeBoard**

AP Microeconomics

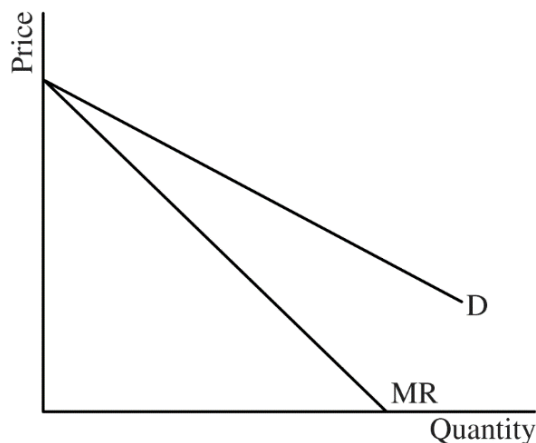
Scoring Guidelines

2018 SCORING GUIDELINES

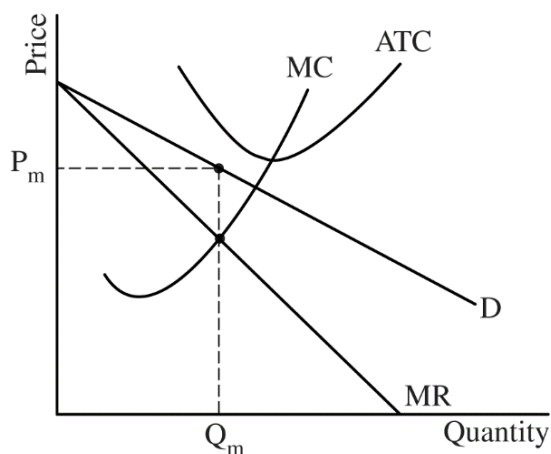
Question 1

9 points (5 + 1 + 1 + 2)

(a) 5 points:



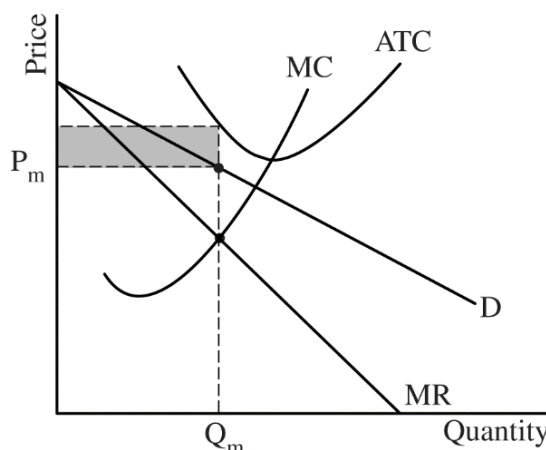
- One point is earned for drawing a correctly labeled graph for a monopoly showing a downward sloping demand (D) curve with the marginal revenue (MR) curve below the demand curve.



- One point is earned for showing the marginal cost (MC) curve rising and passing through the minimum of the average total cost (ATC) curve.
- One point is earned for showing the profit-maximizing quantity, Q_m , where $MR = MC$.
- One point is earned for showing the price, P_m , from the demand curve at Q_m .

2018 SCORING GUIDELINES

Question 1 (continued)



- One point is earned for completely shading the area representing negative economic profit and showing the ATC curve above the demand curve for all quantities.

(b) 1 point:

- One point is earned for stating that the price must be greater than average variable cost, OR total revenue must be greater than total variable cost, OR the firm's current economic loss is less than its fixed cost, which is equal to the firm's loss if it shuts down.

(c) 1 point:

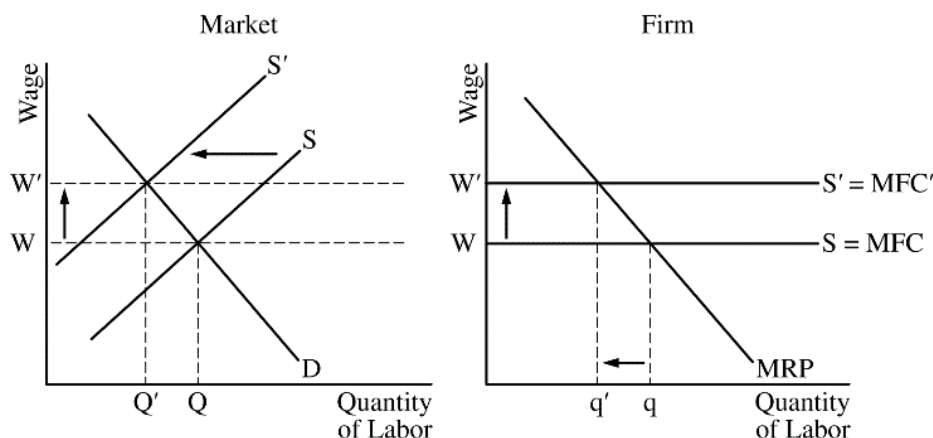
- One point is earned for stating that total revenue will decrease and explaining with one of the following reasons.
 - The monopolist is operating on the elastic portion of the demand curve.
 - The quantity effect is greater than the price effect.
 - The percentage change in quantity demanded is greater than the percentage change in price.
 - MR is positive.

(d) 2 points:

- One point is earned for stating or graphically showing that the wage rate will increase because the market supply of labor decreases (shifts left).
- One point is earned for stating the marginal revenue product (MRP) of the last worker hired will increase and explaining with one of the following reasons.
 - The firm is hiring fewer workers now and therefore the marginal product of the last worker hired increases (diminishing marginal product).
 - The market wage (marginal factor cost or MFC) increased and the profit-maximizing firm will hire where $MRP = MFC$.
 - There is an upward movement along the firm's MRP curve as wage or MFC increases (shifts up).

2018 SCORING GUIDELINES

Question 1 (continued)



2018 SCORING GUIDELINES

Question 2

6 points (1 + 1 + 1 + 1 + 2)

(a) 1 point:

- One point is earned for stating positive externality, and for explaining that either marginal social benefit is greater than marginal private benefit ($MSB > MPB$) or the equilibrium quantity is less than the socially optimal quantity.

(b) 1 point:

- One point is earned for identifying the market equilibrium price as \$6 and the market equilibrium quantity as 16 units.

(c) 1 point:

- One point is earned for identifying the area of the deadweight loss as DEF.

(d) 1 point:

- One point is earned for identifying \$4 as the dollar value of the per-unit subsidy.

(e) 2 points:

- One point is earned for identifying 8 units.
- One point is earned for stating no and explaining with one of the following reasons:
 - The quantity exchanged in the market will be less than the socially optimal quantity.
 - $MSB > MSC$ at a quantity of 8 units.
 - Deadweight loss increased after the price floor.

2018 SCORING GUIDELINES**Question 3****5 Points (1 + 1 + 1 + 1 + 1)**

(a) 1 point:

- One point is earned for correctly calculating the gain, 20 points.

(b) 1 point:

- One point is earned for correctly calculating the opportunity cost, 6 points for that hour (or 6/20).

(c) 1 point:

- One point is earned for stating that the opportunity cost increases and for using one the following explanations:
 - The expected score on microeconomics decreases at an increasing rate with each additional hour spent studying history.
 - The marginal cost is rising (expected score on microeconomics decreases) for each additional hour spent studying history.

(d) 1 point:

- One point is earned for stating that Nirali should spend 2 hours on studying microeconomics and 3 hours on studying history to maximize the sum of expected scores.

(e) 1 point:

- One point is earned for stating that Nirali will spend the additional hour studying microeconomics because studying microeconomics will increase her expected total score by 8 points compared to 5 points if spent studying history.

2017**AP[®]****CollegeBoard**

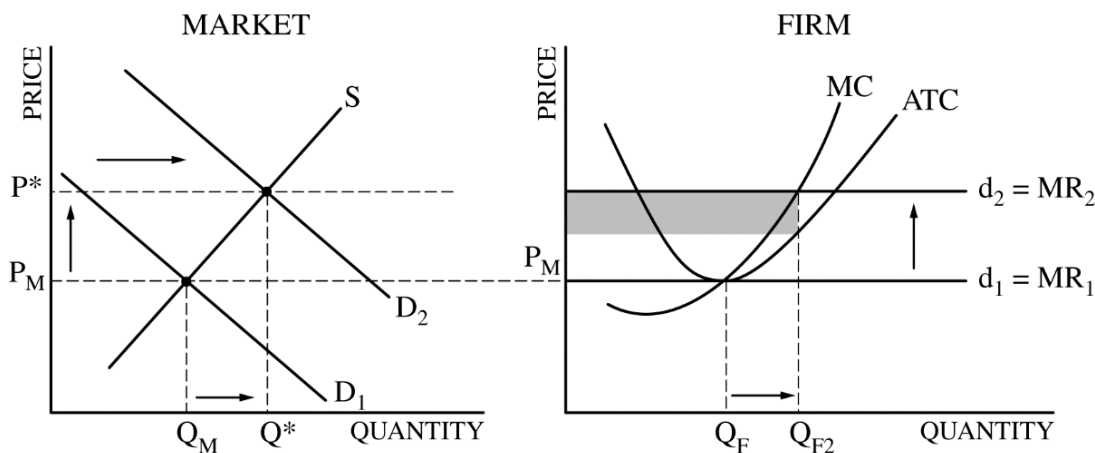
AP Microeconomics

Scoring Guidelines

2017 SCORING GUIDELINES

Question 1

10 points (4 + 2 + 1 + 1 + 2)



(a) 4 points:

- One point is earned for drawing a correctly labeled graph of the corn market with P_M and Q_M . The market demand curve must be downward sloping and the market supply curve must be upward sloping.
- One point is earned for showing a horizontal demand curve on the firm's graph extended from the market equilibrium price, P_M .
- One point is earned for identifying the firm's profit-maximizing quantity, Q_F , at marginal cost equal to marginal revenue ($MC=MR_1$).
- One point is earned for showing the firm's average total cost (ATC) curve and marginal cost (MC) passing through the minimum point of ATC, and $P = ATC = MC$ at Q_F .

Note: All quantities and prices should be labeled on the axes and connected to the intersection points by dashed lines.

(b) 2 points:

- One point is earned for showing a rightward shift of the market demand curve and a higher price and quantity, P^* and Q^* .
- One point is earned for completely shading the area representing the profit for a representative corn farmer.

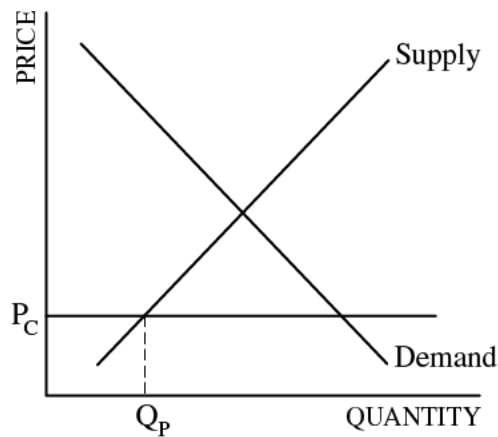
(c) 1 point:

- One point is earned for stating that the market quantity will increase and the market's price will decrease in the long run, and for explaining that new corn farmers will enter the market, which will increase the market supply curve.

2017 SCORING GUIDELINES**Question 1 (continued)**

(d) 1 point:

- One point is earned for stating that the price of soybeans in the next planting season will increase, and for explaining that the supply of soybeans will decrease because the higher price of corn encourages farmers to substitute corn for soybeans in production.



(e) 2 points:

- One point is earned for showing a correctly labeled graph of the corn market, with the price ceiling, P_C , below the equilibrium price of corn.
- One point is earned for showing the quantity purchased by consumers in the corn market labeled as Q_P where P_C intersects the supply curve.

2017 SCORING GUIDELINES**Question 2****5 points** (1 + 4)

(a) 1 point:

- One point is earned for stating that the firm would be operating with increasing returns to scale and for explaining that doubling inputs will more than double output (output increases from 10 units to 50 units as a result of doubling labor and capital) **or** for explaining that average total cost decreases from \$27.50 to \$11 when labor and capital double.

(b) 4 points:

- One point is earned for correctly calculating the marginal product (MP) for the third unit of labor as 25 units and showing the work: $\frac{75-50}{3-2} = 25$.
- One point is earned for answering yes and for explaining that the MP of the third unit of labor (25 units) is less than the MP of the second unit of labor (30 units).
- One point is earned for correctly calculating the firm's average total cost (ATC) and showing the work: $\frac{75 \cdot 2}{75} + \frac{200 \cdot 3}{75} = 2 + 8 = \10 **or** $\frac{(75 \cdot 2) + (200 \cdot 3)}{75} = \frac{750}{75} = \10 .
- One point is earned for identifying the lowest output price as \$8 at which the third unit of labor would be hired.

2017 SCORING GUIDELINES**Question 3****7 points** (2 + 1 + 1 + 2 + 1)

(a) 2 points:

- One point is earned for correctly identifying the monopolist's profit-maximizing quantity, Q_3 .
- One point is earned for correctly identifying the monopolist's profit-maximizing price, P_4 .

(b) 1 point:

- One point is earned for stating that $MSC > MPC$ **or** that the MSC curve exceeds, is above, or is greater than the MPC curve.

(c) 1 point:

- One point is earned for correctly identifying the socially optimal quantity, Q_3 .

(d) 2 points:

- One point is earned for correctly identifying the dollar value of the tax, $P_4 - P_1$.
- One point is earned for correctly identifying the profit-maximizing quantity associated with the tax, Q_2 .

(e) 1 point:

- One point is earned for correctly stating that the deadweight loss increases because the monopolist's profit-maximizing quantity is equal to the socially optimal quantity before the tax and is less than the socially optimal quantity after the tax.

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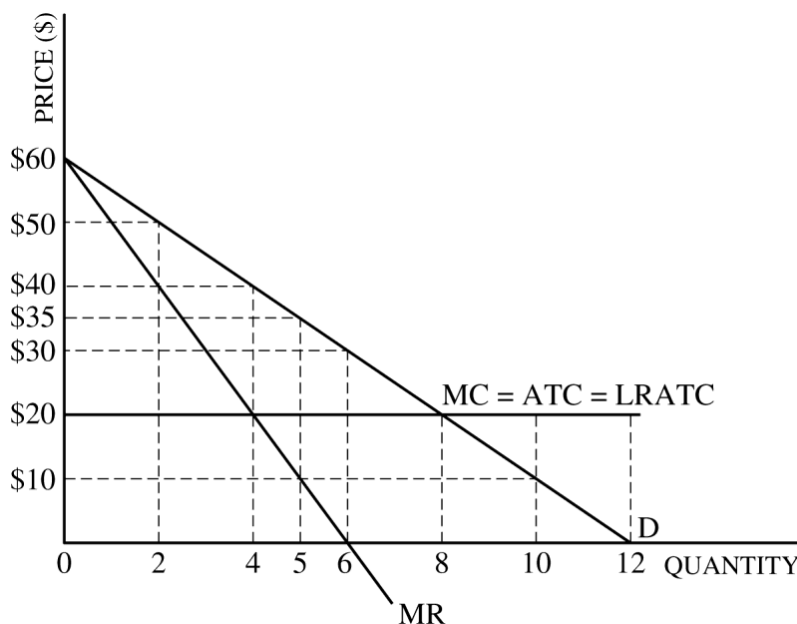
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2014 SCORING GUIDELINES

Question 1

10 points (3 + 1 + 3 + 1 + 2)



3 points:

- One point is earned for identifying the profit-maximizing quantity, $Q = 4$.
- One point is earned for identifying the profit-maximizing price, $P = \$40$.
- One point is earned for identifying the allocatively efficient output, $Q = 8$.

1 point:

- One point is earned for stating that the firm is not experiencing economies of scale and for explaining that the LRATC is not downward sloping as output increases or LRATC remains constant as output increases.

3 points:

- One point is earned for correctly showing the calculation for the monopolist's economic profit.

$$\pi = (P - ATC) \times Q = (\$10 - \$20) \times 10 = -\$100$$

Or loss of \$100

Other correct calculations are acceptable.

- One point is earned for correctly showing the calculation of consumer surplus.

$$CS = 1/2 (\$60 - \$10) \times 10 = \$250$$

Other correct calculations are acceptable.

- One point is earned for correctly showing the calculation of the deadweight loss.

$$DWL = 1/2 (\$20 - \$10) \times (10 - 8) = \$10$$

Other correct calculations are acceptable.

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Question 1 continued

1 point:

- One point is earned for identifying the quantity at which demand is unit elastic, 6.

2 points:

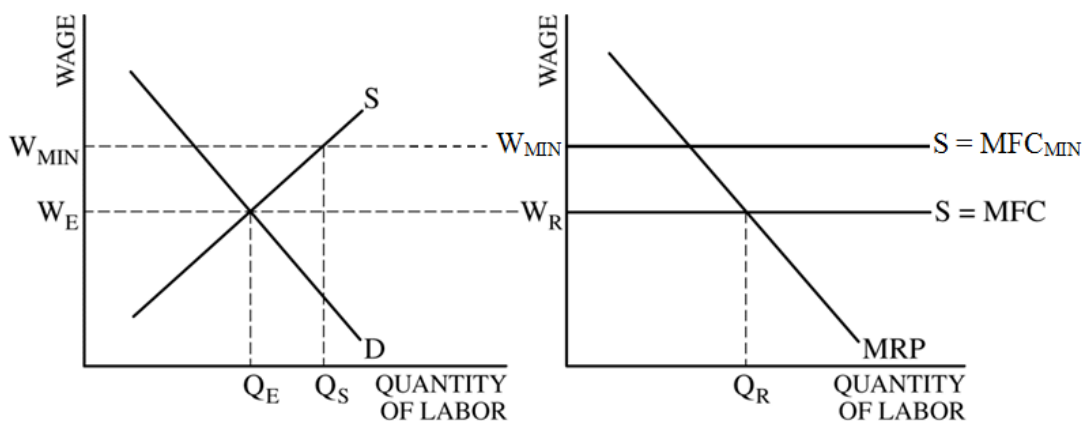
- One point is earned for correctly determining the monopolist's profit.

$$1/2[(\$60 - \$20) \times 8] = \$160$$
- One point is earned for correctly determining the consumer surplus as zero.

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Question 2

6 points (2 + 1 + 3)



2 points:

- One point is earned for drawing a correctly labeled graph of the labor market with an upward-sloping labor supply curve and a downward-sloping labor demand curve and for correctly identifying the equilibrium wage, W_E , and quantity, Q_E .
- One point is earned for drawing a correctly labeled graph showing Ray's Stable demand curve for labor and a horizontal labor supply curve and showing the equilibrium wage, W and quantity, Q_R .

1 point:

- One point is earned for stating that Ray's Stable's marginal factor cost is equal to W and for explaining that the firm is a wage taker in the labor market and/or the market sets the wage.

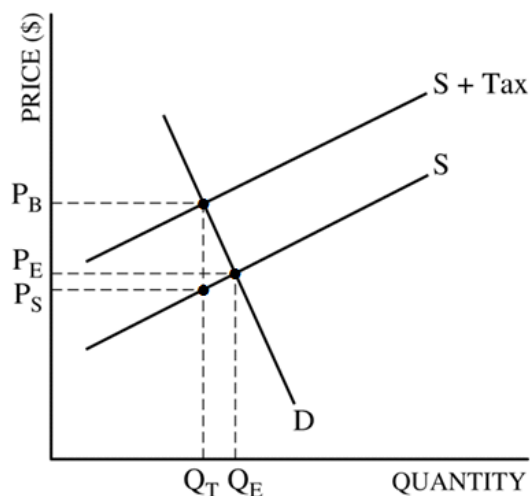
3 points:

- One point is earned for showing the minimum wage, W_{MIN} , on the graph in part (a) above the equilibrium wage W_E .
- One point is earned for showing the quantity supplied of unskilled labor, Q_S , derived from the supply curve at W_{MIN} .
- One point is earned for stating that the marginal revenue product of the last worker hired will increase.

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Question 3

6 points (1 + 3 + 1 + 1)



1 point:

- One point is earned for drawing a correctly labeled graph of the gasoline market showing the equilibrium price, P_E , and quantity, Q_E .

3 points:

- One point is earned for showing P_B above P_E , derived from the D curve at Q_T .
- One point is earned for showing P_S below P_E , derived from the S curve at Q_T .
- One point is earned for showing Q_T less than Q_E .

Note: It is not necessary to draw the $S + \text{Tax}$ curve; a “tax wedge” approach is acceptable.

1 point:

- One point is earned for correctly calculating the total tax revenue based on the labeling of the graph.

All of the following are acceptable when P_B and P_S are correct:

- $(P_B \times Q_T) - (P_S \times Q_T)$
- $(P_B - P_S) \times Q_T$
- $2 \times Q_T$
- $\text{Tax} \times Q_T$

1 point:

- One point is earned for explaining that the tax burden will fall more on buyers and less on sellers because the demand curve is more inelastic than the supply curve.