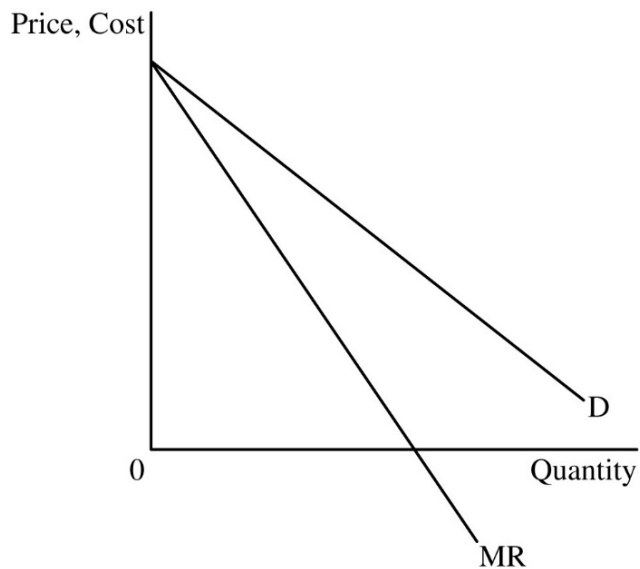
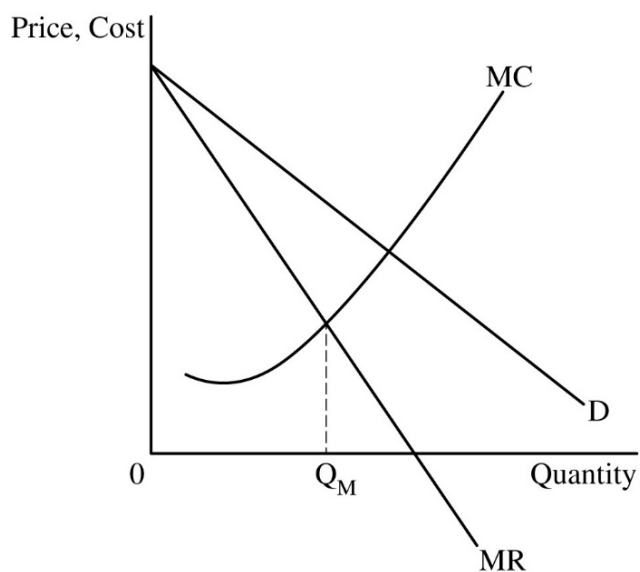


**Question 1: Long****10 points**

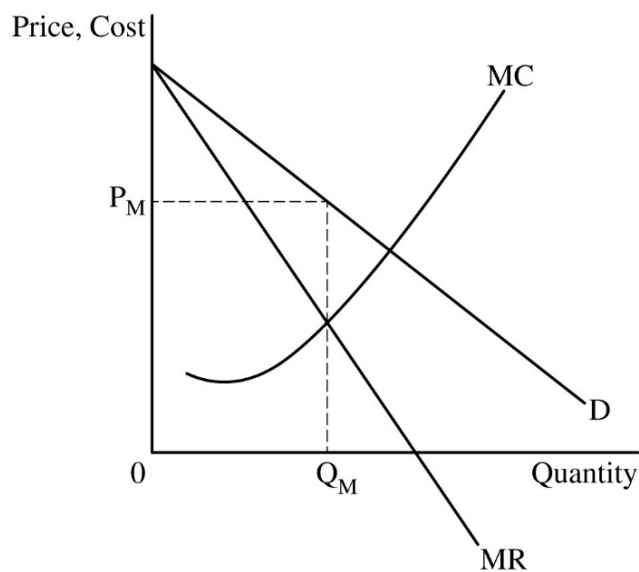
- A** Draw a correctly labeled graph for Voda Reservoir with a downward-sloping demand (D) curve and a downward-sloping marginal revenue (MR) curve with the MR curve below the D curve. **1 point**
- Point 1



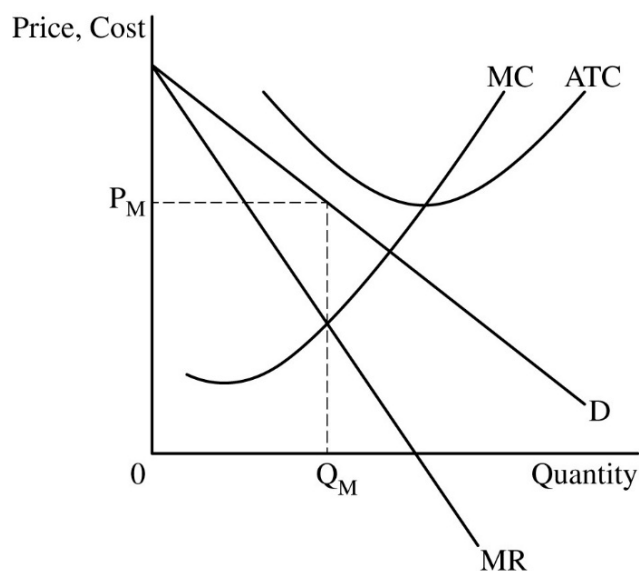
- Point 2 The graph must show a rising marginal cost (MC) curve and the profit-maximizing quantity, labeled  $Q_M$ , where  $MR = MC$ . **1 point**



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

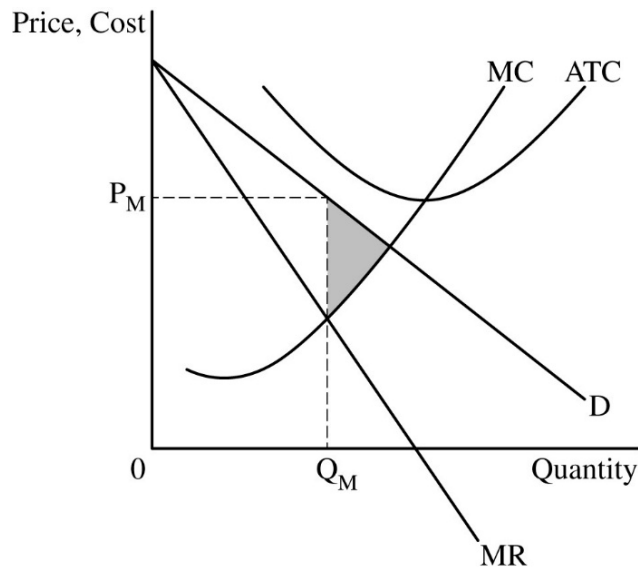


- Point 4 The graph must show the average total cost (ATC) curve above the D curve and show the MC curve passing through the minimum point of the ATC curve. **1 point**



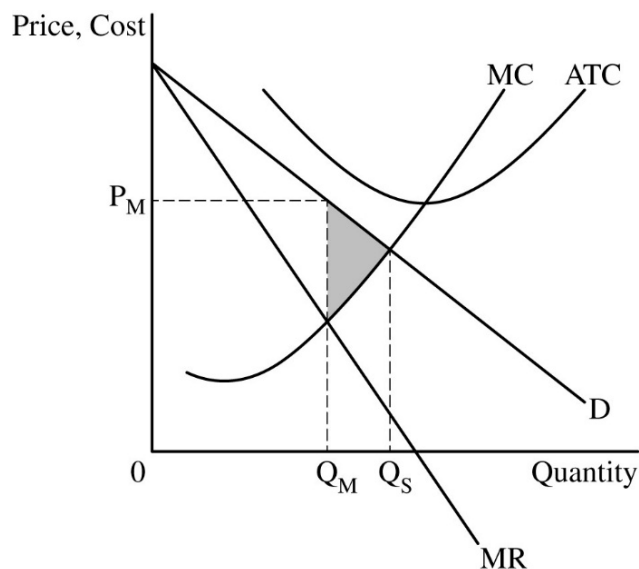
Point 5 The graph must show the area of deadweight loss, shaded completely.

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

|          |             |                                                                                                                                                                                                                                       |                |
|----------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>E</b> | <b>(i)</b>  | 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. | <b>1 point</b> |
| Point 9  |             |                                                                                                                                                                                                                                       |                |
|          | <b>(ii)</b> | State that the market wage will increase in the short run and explain that the new regulation will decrease the supply of workers.                                                                                                    | <b>1 point</b> |
| Point 10 |             |                                                                                                                                                                                                                                       |                |

**Question 2: Short****5 points**

|          |             |                                                                                                                                                                                                                                                                         |                |
|----------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>A</b> |             | State that the profit-maximizing number of miners is 4.                                                                                                                                                                                                                 | <b>1 point</b> |
| Point 1  |             |                                                                                                                                                                                                                                                                         |                |
| <b>B</b> |             | State that Quartz Excavations will pay a wage rate that is less than \$15 and explain that the wage rate paid by a monopsonist is determined by the supply of labor at the quantity of labor hired. Thus, the wage rate associated with the hiring of 4 miners is \$10. | <b>1 point</b> |
| Point 2  |             |                                                                                                                                                                                                                                                                         |                |
| <b>C</b> |             | Calculate the total wage bill as \$50 and show your work.                                                                                                                                                                                                               | <b>1 point</b> |
| Point 3  |             | Total Wage Bill = $\$25 \times 2 = \$50$                                                                                                                                                                                                                                |                |
| <b>D</b> | <b>(i)</b>  | State that the marginal revenue product of miners will increase and explain that the increase in demand for quartz will increase the price and marginal revenue of quartz.                                                                                              | <b>1 point</b> |
| Point 4  |             |                                                                                                                                                                                                                                                                         |                |
|          | <b>(ii)</b> | State that the marginal factor cost of the last miner hired will be greater than the marginal factor cost of the last miner hired before the increase in the demand for quartz.                                                                                         | <b>1 point</b> |
| Point 5  |             |                                                                                                                                                                                                                                                                         |                |

**Question 2: Short****5 points**

(a) State that the market equilibrium price is \$15, and the market equilibrium quantity is 300 units. **1 point**

(b) Calculate the deadweight loss as \$500 and show your work. **1 point**

$$\text{Deadweight loss} = \frac{1}{2} \times (\$25 - \$15) \times (400 - 300) = \frac{1}{2} \times \$10 \times 100 = \$500$$

(c) (i) State that the government will grant a per-unit subsidy to consumers to achieve the socially optimal quantity of Good X and explain with **ONE** of the following: **1 point**

- A per-unit subsidy to consumers that internalizes external benefits increases the incentive and ability of consumers to buy the socially optimal quantity (400).
- A per-unit subsidy to consumers equal to the marginal external benefit increases consumption to the socially optimal quantity (400), by lowering the price paid by the consumer.
- A per-unit subsidy to consumers equal to the difference between marginal social benefit and marginal private benefit increases the quantity exchanged to the socially optimal quantity (400).

(ii) State that the dollar value of the per-unit subsidy is \$10. **1 point**

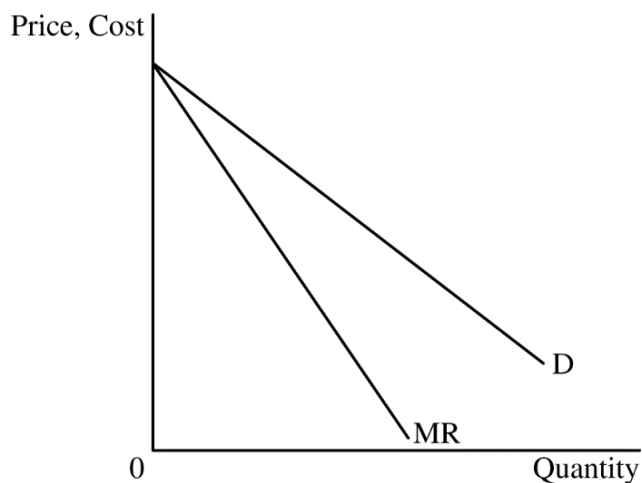
**Total for part (c) 2 points**

(d) State no, the price ceiling will not achieve the socially optimal quantity of Good X and explain that the price ceiling will cause the quantity exchanged in the market, which is limited by the quantity supplied (200), to be less than the socially optimal quantity (400). **1 point**

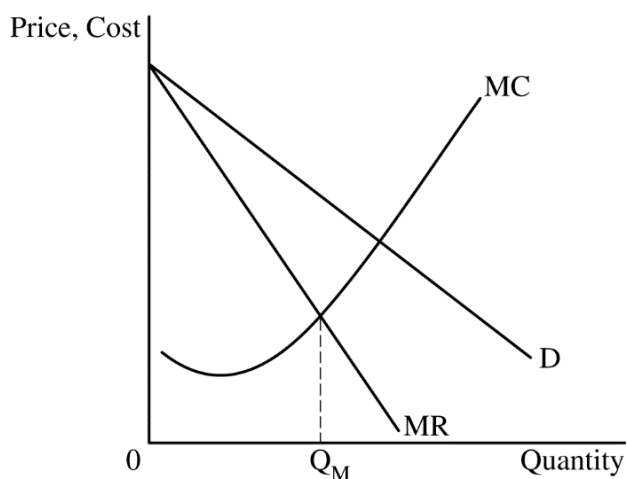
**Total for question 2 5 points**

**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**

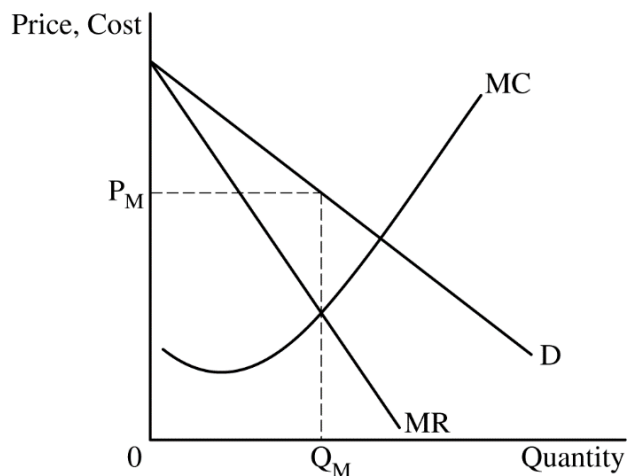


For the second point, the graph must show a marginal cost (MC) curve and the profit-maximizing quantity, labeled  $Q_M$ , where  $MR = MC$ .

**1 point**

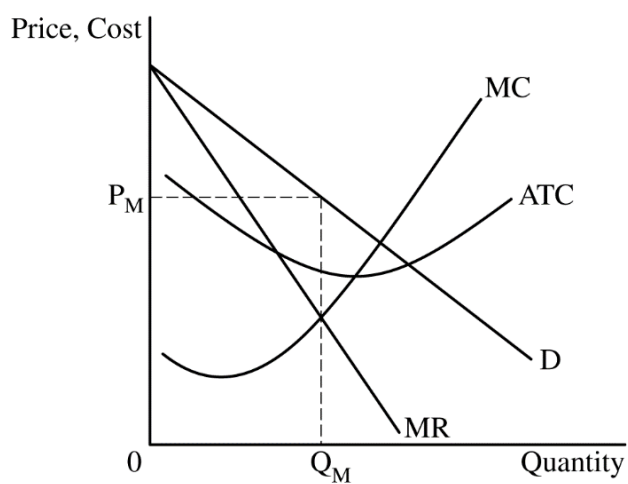
For the third point, the graph must show the profit-maximizing price, labeled  $P_M$ , from the demand curve at  $Q_M$ .

**1 point**



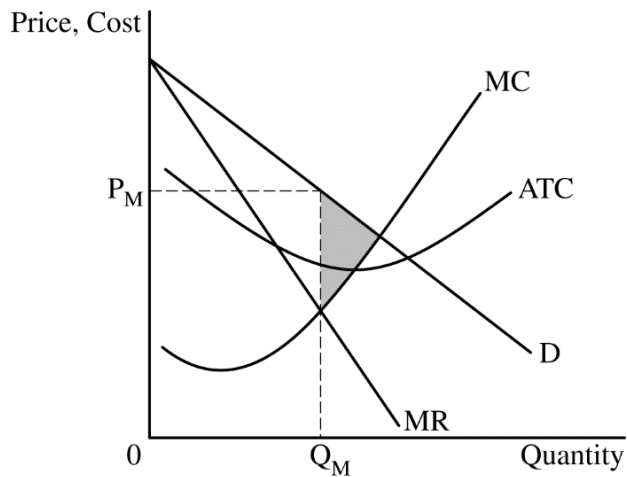
For the fourth point, the graph must show the average total cost (ATC) curve below  $P_M$  at  $Q_M$  and the MC curve passing through the minimum point of the ATC curve.

**1 point**



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

**1 point**

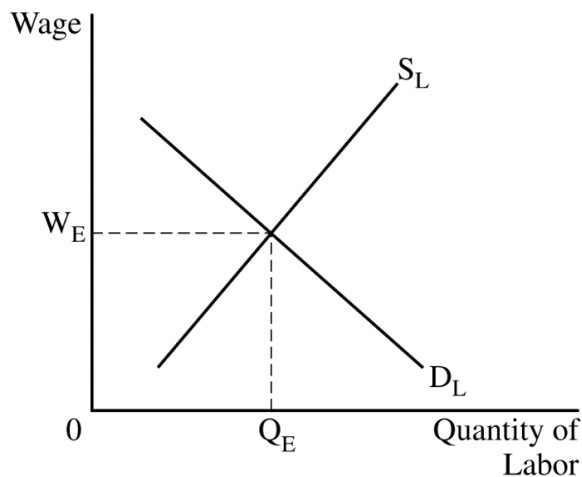


**Total for part (a)**

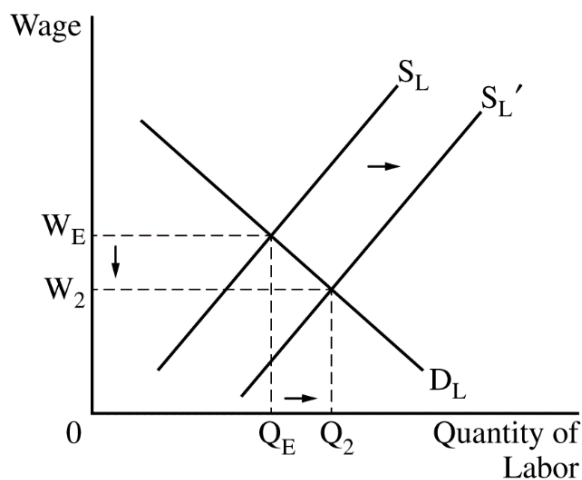
**5 points**

- |            |                                                                                                                                                                                                             |                |
|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>(b)</b> | State that the government would impose a binding price ceiling.                                                                                                                                             | <b>1 point</b> |
| <b>(c)</b> | 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. | <b>1 point</b> |

- (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**

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

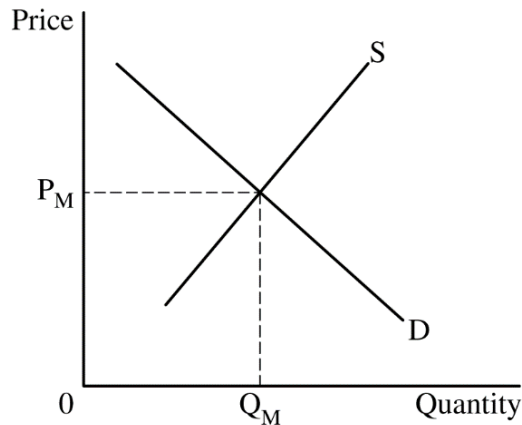
$$\frac{2,500}{\$500} = \frac{1,000}{\text{Wage Rate}}$$

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

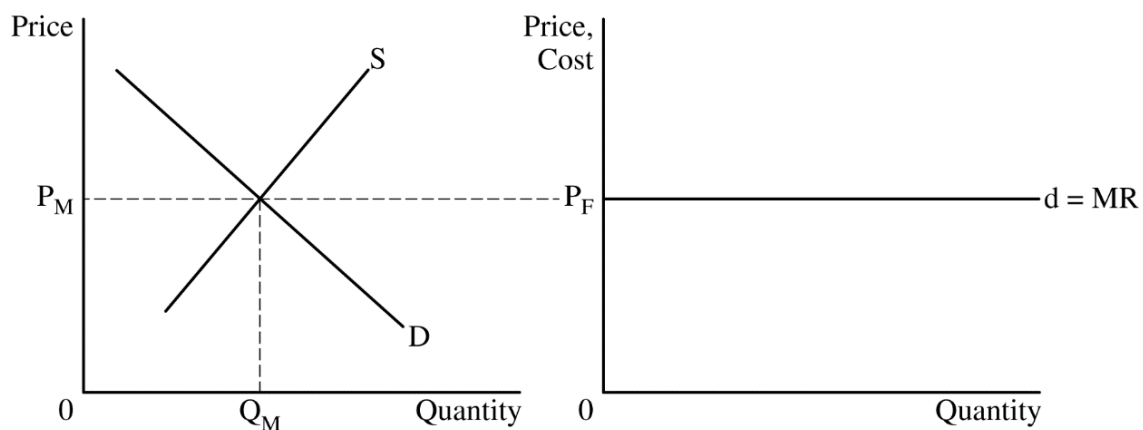
**Total for part (d) 3 points****Total for question 1 10 points**

**Question 1: Long****10 points**

- (a) State that Anderson Company's accounting profit must be greater than its economic profit. **1 point**
- (b) Draw a correctly labeled graph of the market for Good G with a downward-sloping demand (D) curve and upward-sloping supply (S) curve and label the market equilibrium price as  $P_M$  and the market equilibrium quantity as  $Q_M$ . **1 point**

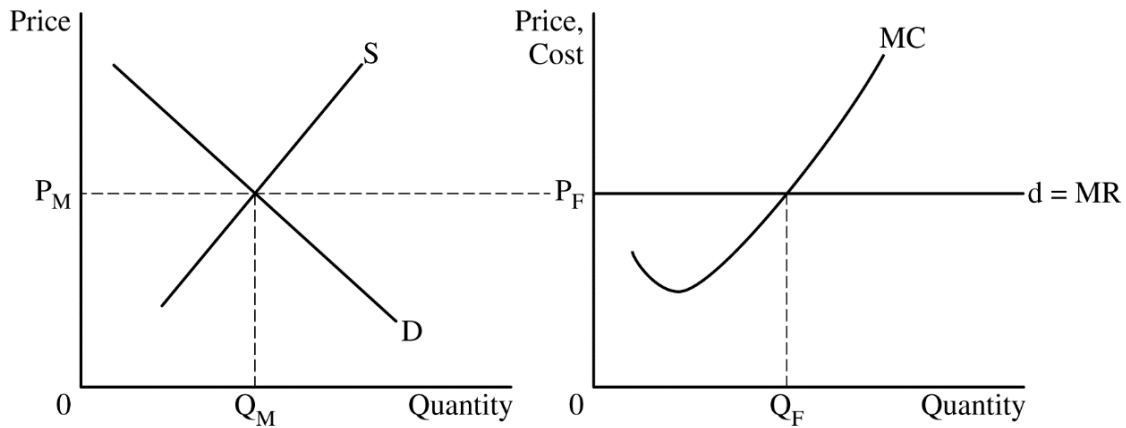


For the second point, draw a correctly labeled graph for the firm and show the firm's horizontal demand and marginal revenue ( $d=MR$ ) curve extended from the market equilibrium price ( $P_M$ ), and label the firm's price as  $P_F$ . **1 point**



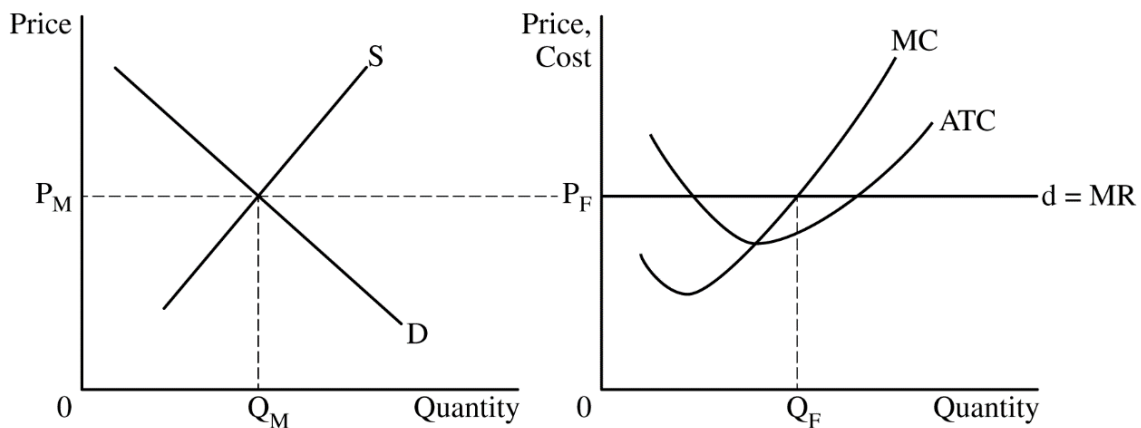
For the third point, the firm's graph must show a rising marginal cost (MC) curve and the profit-maximizing quantity, labeled  $Q_F$  where  $MR = MC$ .

1 point



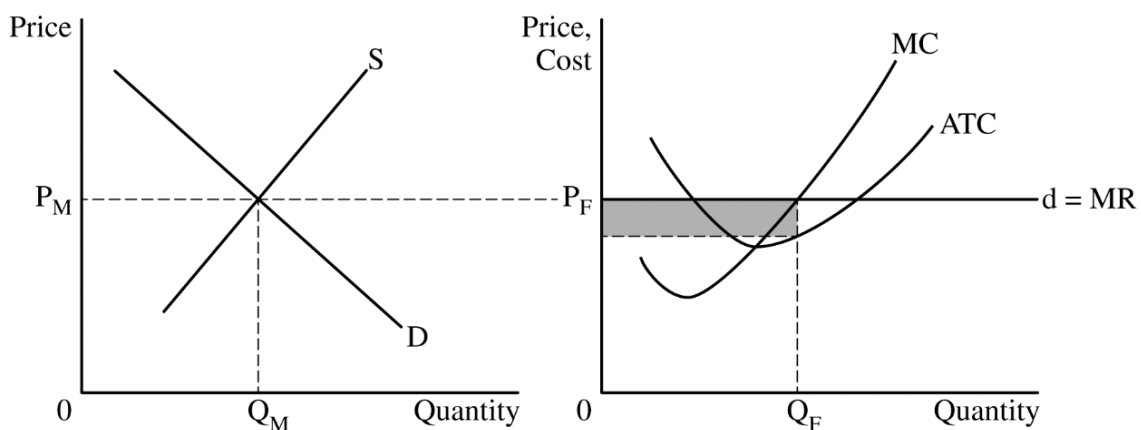
For the fourth point, the firm's graph must show the average total cost (ATC) curve below the firm's demand curve at  $Q_F$  and show the MC curve passing through the minimum point of the ATC curve.

1 point



For the fifth point, the firm's graph must show the area representing positive economic profit, shaded completely.

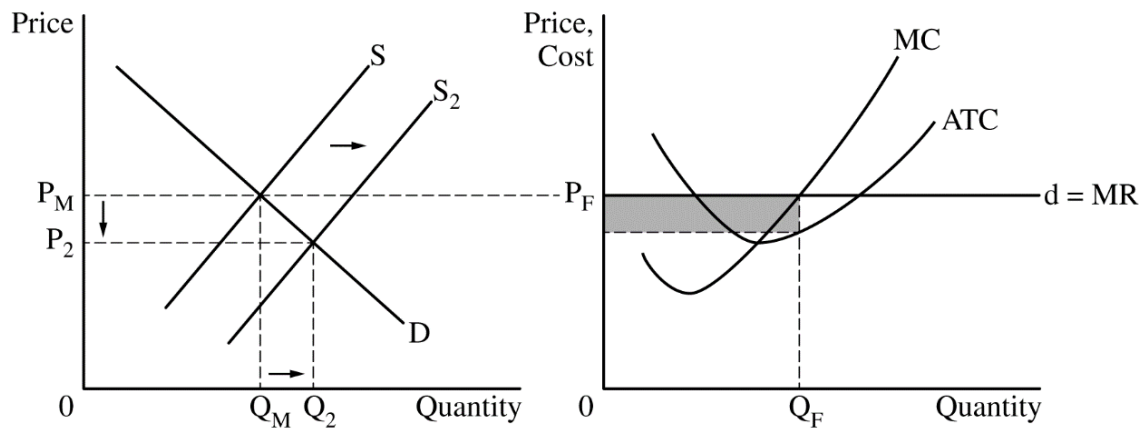
1 point



**Total for part (b) 5 points**

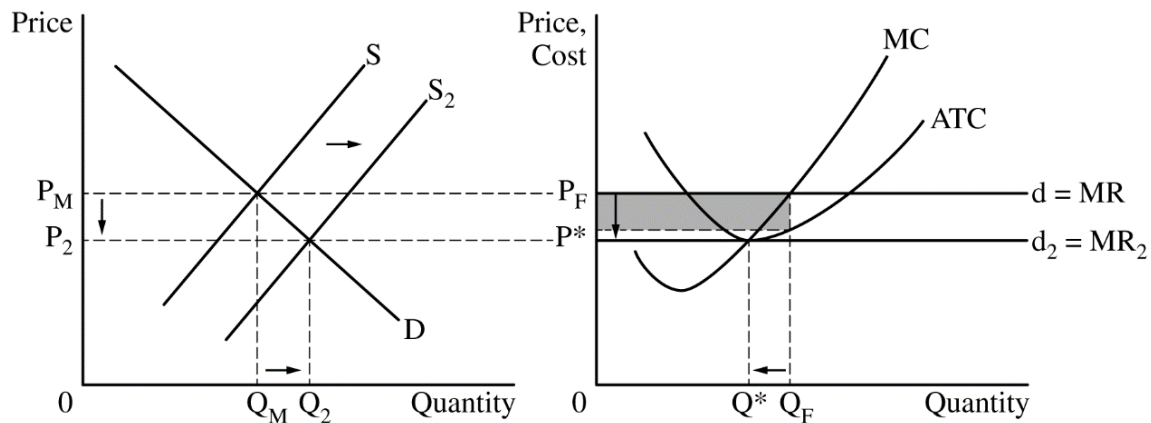
- (c)(i) On the market graph from part (a), show a rightward shift in the market supply curve, resulting in a lower market equilibrium price, labeled  $P_2$ , and a greater market equilibrium quantity, labeled  $Q_2$ .

1 point



- (ii) On the firm's graph from part (a), show a lower price, labeled  $P^*$ , extended from the new market equilibrium price,  $P_2$ , and show a lower quantity produced,  $Q^*$ , at the new intersection point of  $P^* = MR_2 = MC = \text{minimum ATC}$ .

1 point



Total for part (c) 2 points

- (d)(i) State that the market equilibrium quantity will be less than the allocatively efficient quantity and explain that the positive externality in production causes the marginal social cost to be less than the marginal private cost ( $MSC < MPC$ ) at the market equilibrium.

1 point

- (ii) State that total economic surplus will increase and explain with **ONE** of the following:

1 point

- The quantity produced will increase to the allocatively efficient quantity.
- Deadweight loss will decrease to \$0.
- The marginal private cost will equal the marginal social cost, causing the externality to be internalized.

Total for part (d) 2 points

Total for question 1 10 points

**Question 3: Short****5 points**

(a) State yes and explain that this firm is a natural monopoly because it experiences decreasing average total costs over the entire effective demand for its product. **1 point**

(b) State the area of deadweight loss is equal to **ONE** of the following areas: **1 point**

- bfg
- $\frac{1}{2} \times (P_5 - P_1) \times (Q_4 - Q_2)$

(c)(i) State the regulated price is  $P_3$  and the regulated quantity is  $Q_3$ . **1 point**

(ii) State no and explain with **ONE** of the following. **1 point**

- Area cjk is the remaining deadweight loss.
- The deadweight loss is reduced by area bfjc but is not eliminated completely.
- $P_3$  is greater than (or not equal to) marginal cost at  $Q_3$ .
- $Q_3$  is less than (or not equal to) the socially optimal quantity  $Q_4$ .

**Total for part (c) 2 points**

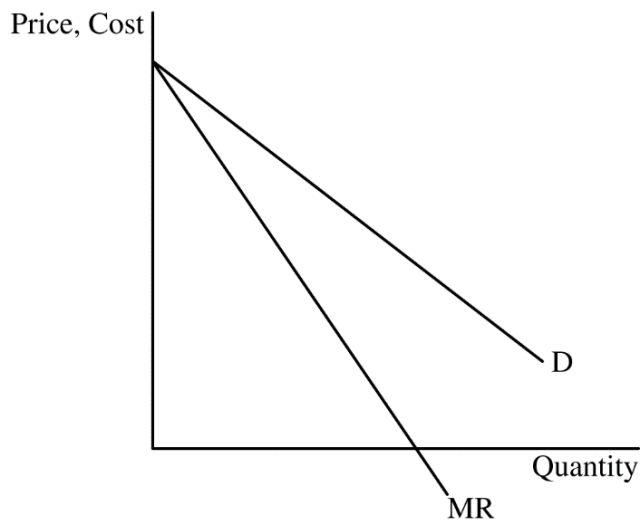
(d) State the firm will earn negative economic profit and explain with **ONE** of the following: **1 point**

- At the socially optimal quantity,  $Q_4$ , average total cost ( $P_2$ ) is greater than price ( $P_1$ ).
- At the socially optimal quantity,  $Q_4$ , the area of negative economic profit is  $P_1P_2dg$ .
- At the socially optimal quantity,  $Q_4$ , the area of negative economic profit is  $(P_2 - P_1) \times Q_4$ .

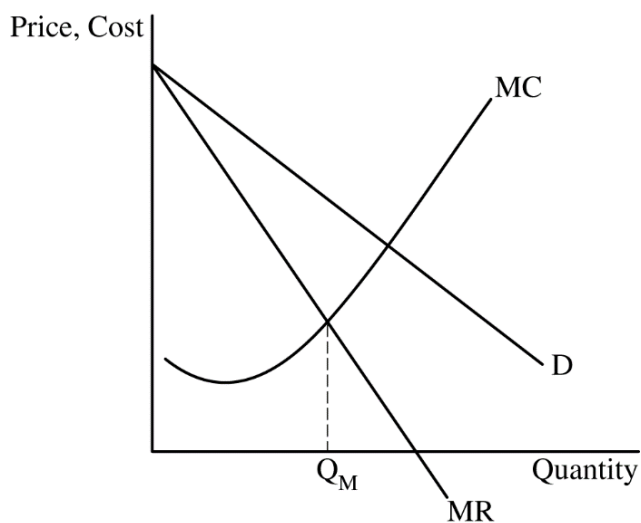
**Total for question 3 5 points**

**Question 1: Long****10 points**

- (a) Draw a correctly labeled graph for a monopoly showing downward-sloping demand (D) and marginal revenue (MR) curves with the MR curve below the demand curve.

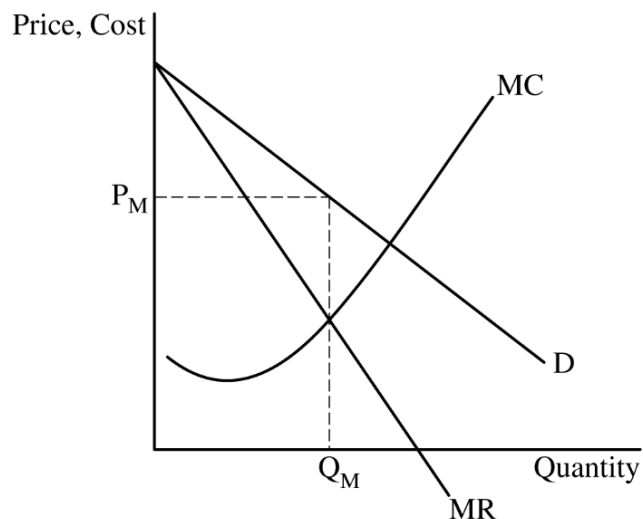
**1 point**

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

**1 point**

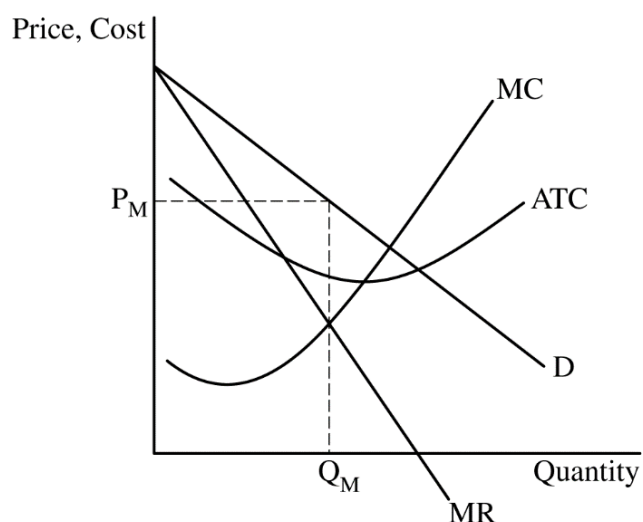
For the third point, the graph must show the profit-maximizing price, labeled  $P_M$ , from the demand curve at  $Q_M$ .

1 point



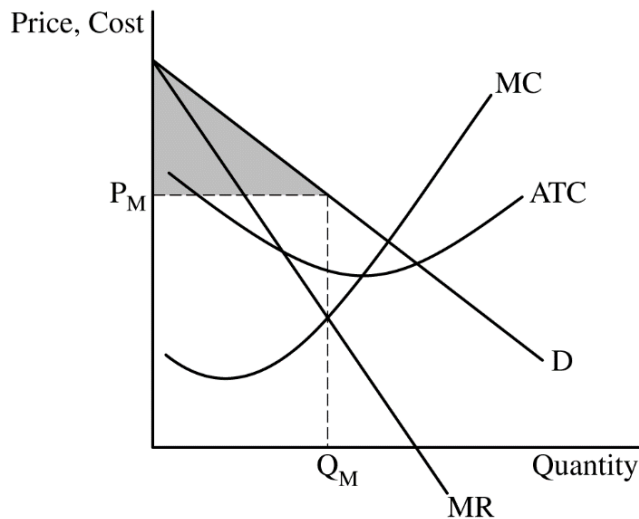
For the fourth point, the graph must show the average total cost (ATC) curve below the demand curve at  $Q_M$  and show the MC curve passing through the minimum point of the ATC curve.

1 point



For the fifth point, the graph must show a completely shaded area of the consumer surplus.

**1 point**



**Total for part (a)**

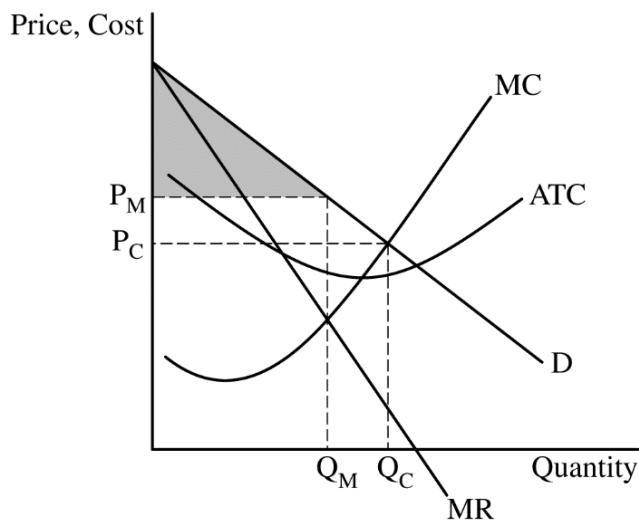
**5 points**

- (b)(i)** State no and explain that a per-unit tax would shift the MC curve upward and intersect the MR curve at a lower quantity, which decreases the firm's profit-maximizing quantity, not increases it to the socially optimal quantity where  $MC=D$ .

**1 point**

- (ii)** On your graph from part (a), show the socially optimal quantity labeled as  $Q_C$  and the price ceiling labeled as  $P_C$  at  $MC=D$ .

**1 point**



- |              |                                                                                                                      |                |
|--------------|----------------------------------------------------------------------------------------------------------------------|----------------|
| <b>(iii)</b> | State that the firm is earning positive economic profit and explain that ATC is less than $P_C$ at $Q_C$ , as shown. | <b>1 point</b> |
|--------------|----------------------------------------------------------------------------------------------------------------------|----------------|

**Scoring Note:** The answer should be consistent with the position of the ATC curve with respect to the demand curve at  $Q_C$  on the graph drawn in part (b)(ii). The firm will not earn positive economic profit if the ATC curve is drawn such that  $ATC > P_C$  or  $ATC = P_C$  at  $Q_C$ .

|                           |                 |
|---------------------------|-----------------|
| <b>Total for part (b)</b> | <b>3 points</b> |
|---------------------------|-----------------|

- |                |                                                                                                                                                                                   |                |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>(c) (i)</b> | State that marginal revenue will be negative and explain that after total revenue is maximized, TR decreases since the firm moves onto the inelastic portion of the demand curve. | <b>1 point</b> |
|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|

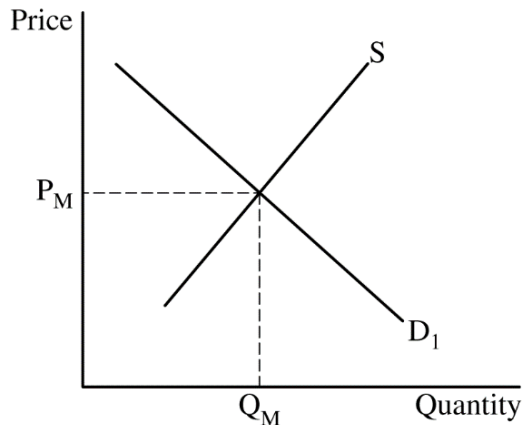
- |             |                                                                                |                |
|-------------|--------------------------------------------------------------------------------|----------------|
| <b>(ii)</b> | State that the percentage increase in quantity demanded will be less than 10%. | <b>1 point</b> |
|-------------|--------------------------------------------------------------------------------|----------------|

|                           |                 |
|---------------------------|-----------------|
| <b>Total for part (c)</b> | <b>2 points</b> |
|---------------------------|-----------------|

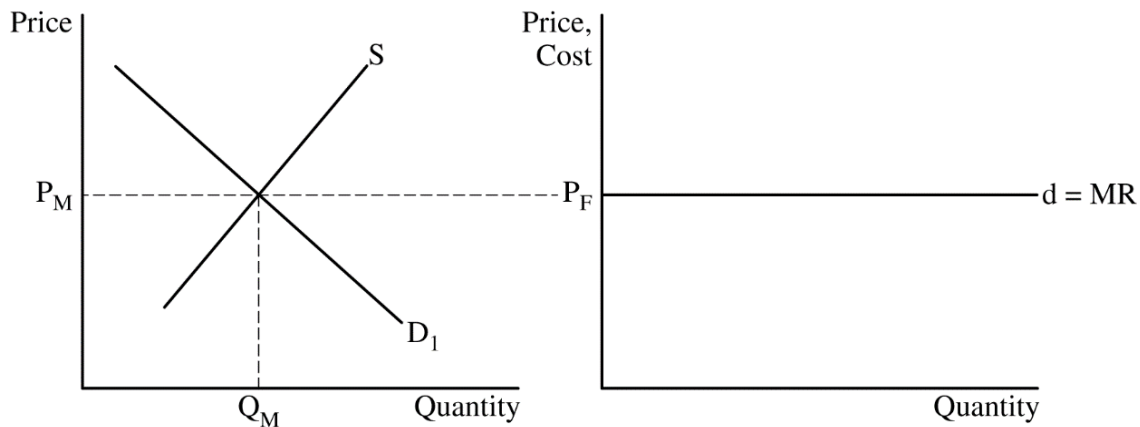
|                             |                  |
|-----------------------------|------------------|
| <b>Total for question 1</b> | <b>10 points</b> |
|-----------------------------|------------------|

**Question 1: Long****10 points**

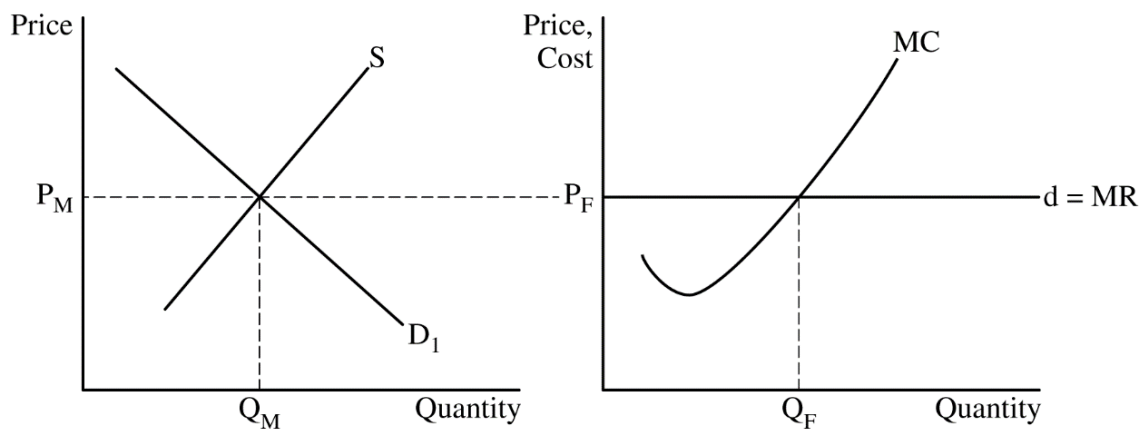
- (a) Draw a correctly labeled graph of the market for sugar and show the equilibrium price and quantity, labeled  $P_M$  and  $Q_M$ , respectively. **1 point**



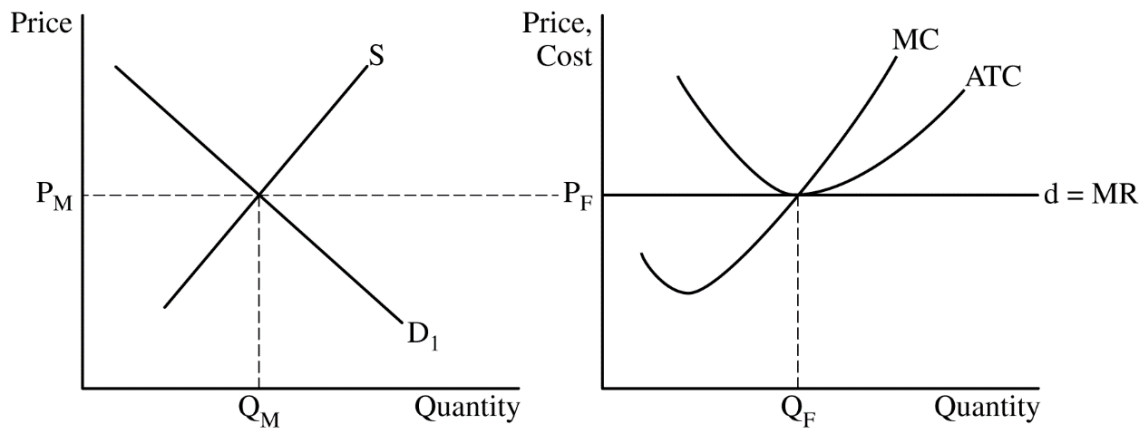
- For the second point, the graph must show a horizontal demand curve ( $d = MR$ ) for Frank Sugar Co. and label the firm's profit-maximizing price  $P_F$  at  $P_M$ . **1 point**



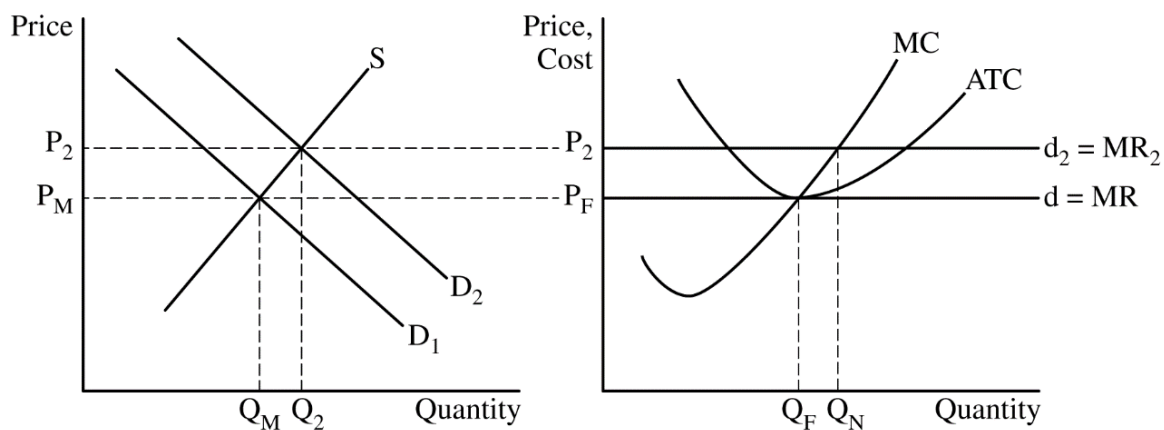
- For the third point, the firm's graph must show the marginal cost (MC) curve and show the profit-maximizing quantity, labeled  $Q_F$  where  $MR = MC$ . **1 point**



For the fourth point, the firm's graph must show the average total cost (ATC) curve tangent to the firm's demand curve at  $Q_F$  and show the MC curve passing through the minimum point of the ATC curve.

**1 point****Total for part (a) 4 points**

- (b) On your market graph from part (a), show a rightward shift in the market demand curve with a higher market price, labeled  $P_2$ , and show an upward shift in the firm's demand curve with a greater quantity sold by Frank Sugar Co., labeled  $Q_N$ .

**1 point**

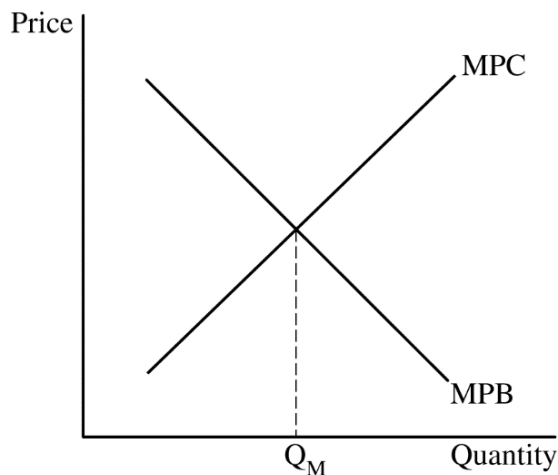
State that the profit earned by Frank Sugar Co. will increase in the short run.

**1 point**

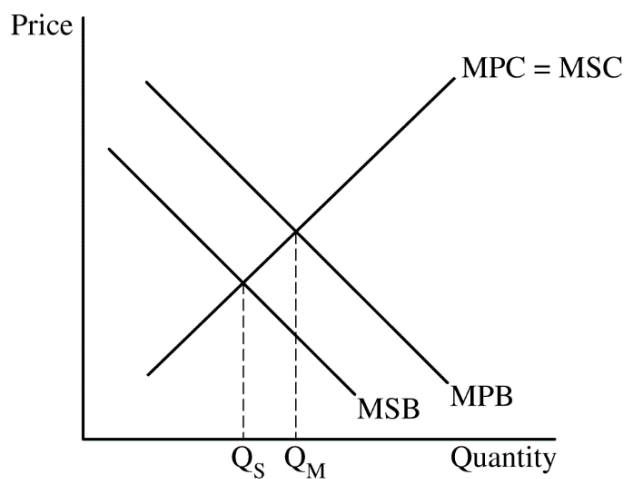
State that the market price in long-run equilibrium will be lower than  $P_2$  and explain that new firms will enter the market, which increases the market supply, lowering the market price back to  $P_M$  where firms earn zero economic profit in the long run.

**1 point****Total for part (b) 3 points**

- (c) Draw a correctly labeled graph with an upward-sloping supply curve, labeled MPC, a downward-sloping demand curve, labeled MPB, and show the market equilibrium quantity, labeled  $Q_M$  at the intersection of the MPB and MPC curves. **1 point**



- For the second point, the graph must show a downward-sloping marginal social benefit (MSB) curve below the MPB curve, label the upward sloping curve  $MPC = MSC$ , and show the socially optimal quantity, labeled  $Q_S$ , at the intersection of the MSB and MSC curves. **1 point**



**Total for part (c) 2 points**

- (d) State that the government would impose a per-unit tax and explain that the tax would raise the price paid per unit **AND** decrease market equilibrium quantity to move it closer to the socially optimal quantity. **1 point**

**Total for question 1 10 points**

**Question 3: Short****5 points**

**(a)** State that the firm is experiencing economies of scale and explain that the long-run average total cost (LRATC) curve is downward sloping over the range of 0 to 60 units. **1 point**

**(b)** State that the price is \$15 and the quantity is 50 units. **1 point**

**(c) (i)** Calculate the total revenue at the socially optimal quantity as \$600 and show your work. **1 point**

$$\text{Total Revenue} = \text{Price} \times \text{Quantity} = \$10 \times 60 = \$600$$

**(ii)** Explain that at the socially optimal quantity, the firm is earning negative economic profit in the short run because price is less than average total cost. **1 point**

**(iii)** Calculate the lump-sum subsidy as \$180 and show your work. **1 point**

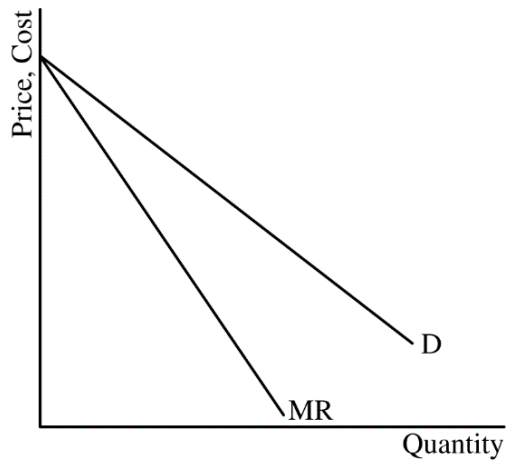
$$\text{Lump-sum Subsidy} = (\text{LRATC} - \text{Price}) \times \text{Quantity} = (\$13 - \$10) \times 60 = \$180$$

**Total for part (c) 3 points**

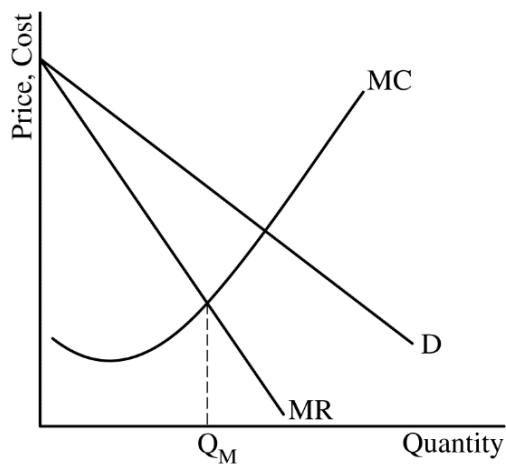
**Total for question 3 5 points**

**Question 1: Long****10 points**

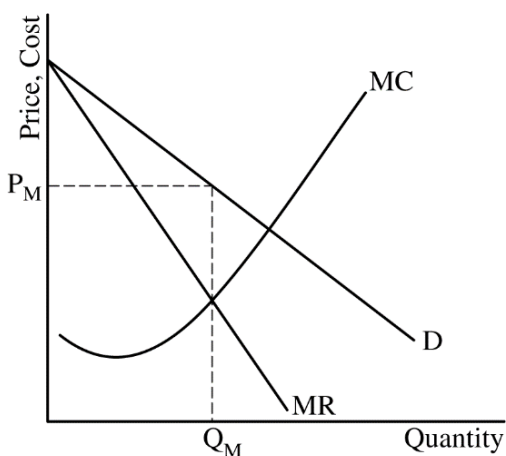
- (a) Draw a correctly labeled graph for SkyRunner Airlines showing downward sloping demand (D) and marginal revenue (MR) curves with the MR curve below the demand curve. **1 point**



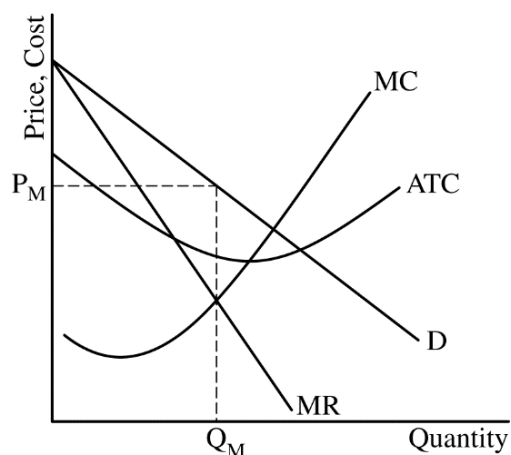
For the second point, the graph must show the marginal cost (MC) curve and the profit-maximizing quantity, labeled  $Q_M$ , where  $MR=MC$ . **1 point**



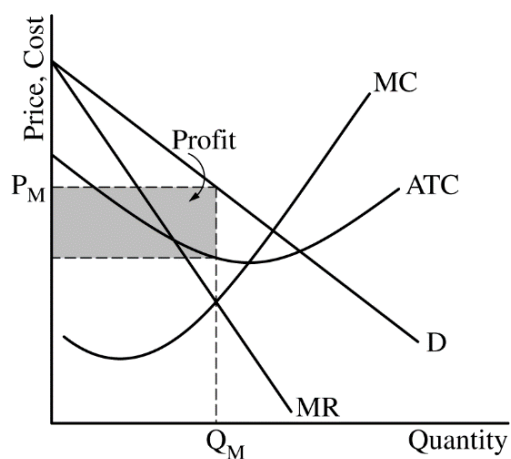
For the third point, the graph must show the profit-maximizing price, labeled  $P_M$ , from the demand curve at  $Q_M$ . **1 point**



For the fourth point, the graph must show the ATC curve below the demand curve at  $Q_M$  with the MC curve rising and intersecting the ATC at its minimum point. **1 point**

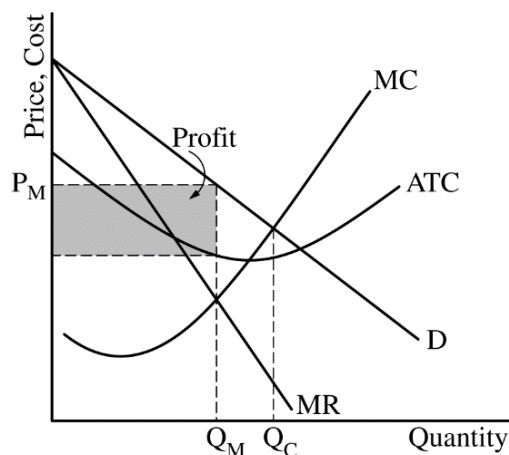


For the fifth point, the graph must show a completely shaded area of profit representing  $(P_M - \text{ATC at } Q_M) \times Q_M$ . **1 point**



**Total for part (a) 5 points**

- (b) On your graph from part (a), show the quantity that is consistent with the goal of eliminating all deadweight loss as  $Q_C$ . **1 point**



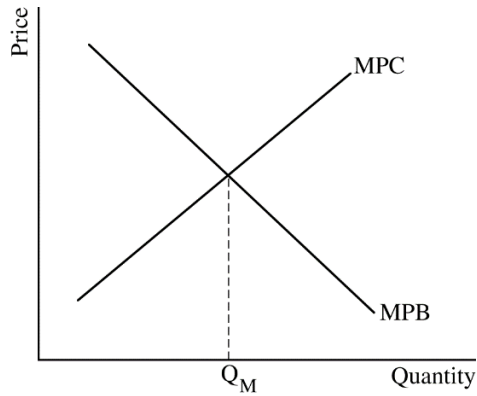
- (c) (i) State that the number of tickets SkyRunner sells will decrease and explain that the entry of new firms will reduce the demand for SkyRunner's service. **1 point**
- (ii) State that the price elasticity of demand for SkyRunner Airlines' service will increase and explain that the entry of new firms will increase the number of substitutes available to consumers. **1 point**
- (iii) State that SkyRunner Airlines' profit will be zero or decrease toward zero. **1 point**
- (iv) State that the deadweight loss will decrease and explain that the entry of new firms increases the total market output (services provided) and moves the output closer to the socially optimal output. **1 point**

**Total for part (c) 4 points**

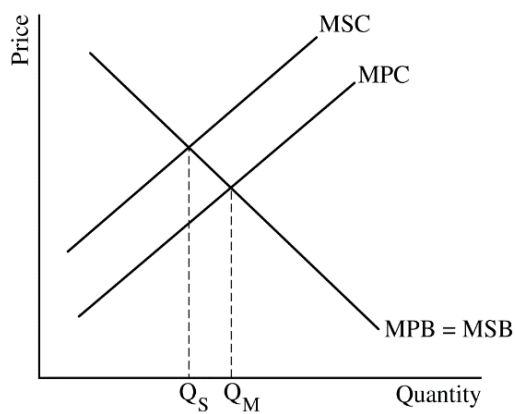
**Total for question 1 10 points**

**Question 2: Short****5 points**

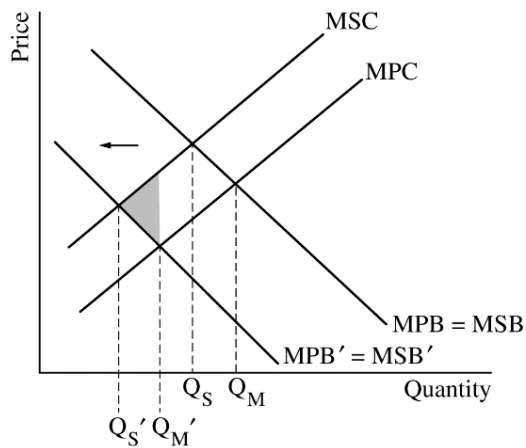
- (a) Draw a correctly labeled graph with an upward-sloping supply curve labeled MPC, a downward-sloping demand curve labeled MPB, and the market equilibrium quantity labeled  $Q_M$ . **1 point**



- For the second point, the graph must include the MSC curve above the MPC curve at all output levels and must show the socially efficient quantity labeled  $Q_S$ . **1 point**

**Total for part (a) 2 points**

- (b) On your graph from part (a), show a leftward shift of the demand curve and shade completely the area of deadweight loss at the new market equilibrium. **1 point**



- (c) (i) State that the per-unit tax would be equal to the marginal external cost ( $MSC - MPC$ ). **1 point**
- (ii) Explain that the lump-sum tax will not change the quantity produced because it does not affect the marginal cost. **1 point**

**Total for part (c) 2 points**

**Total for question 2 5 points**

**2018**

**AP**

**CollegeBoard**

# AP Microeconomics

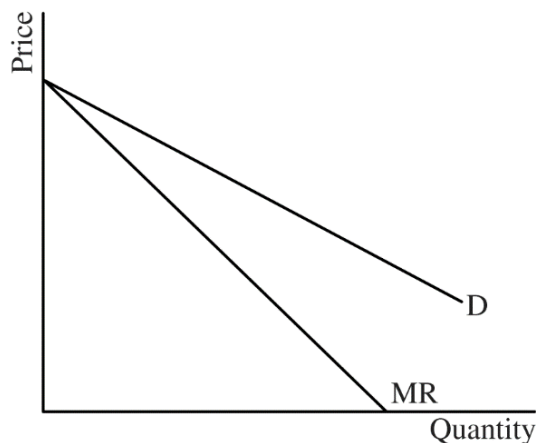
## Scoring Guidelines

# 2018 SCORING GUIDELINES

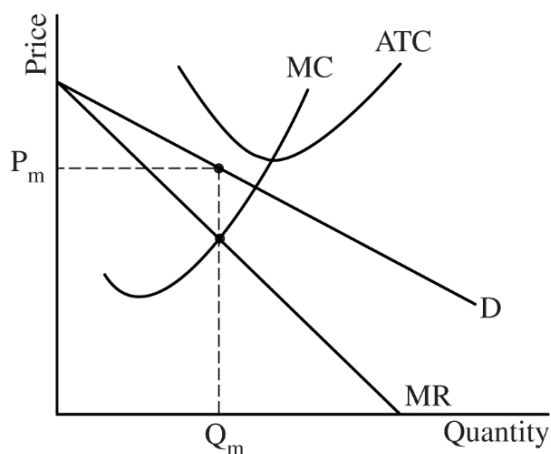
## Question 1

9 points (5 + 1 + 1 + 2)

(a) 5 points:



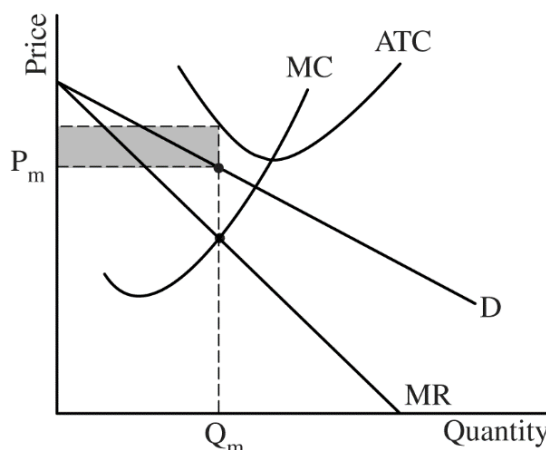
- One point is earned for drawing a correctly labeled graph for a monopoly showing a downward sloping demand (D) curve with the marginal revenue (MR) curve below the demand curve.



- 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:

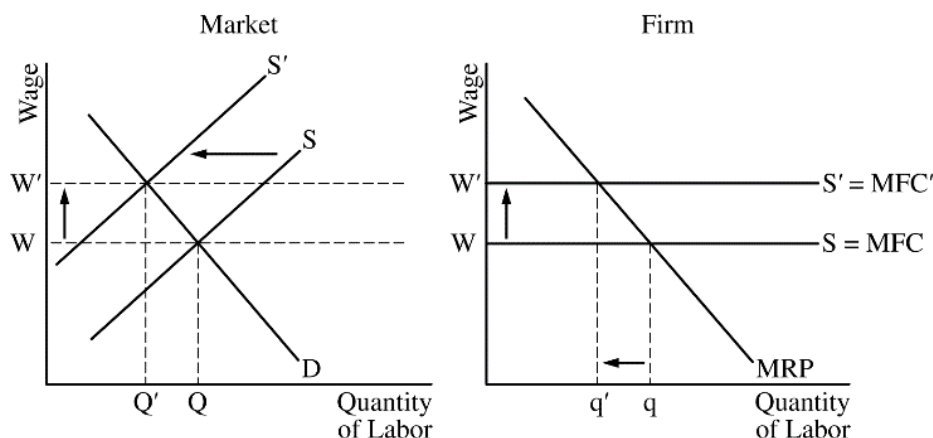
- One point is earned for stating that total revenue will decrease and explaining with one of the following reasons.
  - The monopolist is operating on the elastic portion of the demand curve.
  - The quantity effect is greater than the price effect.
  - The percentage change in quantity demanded is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