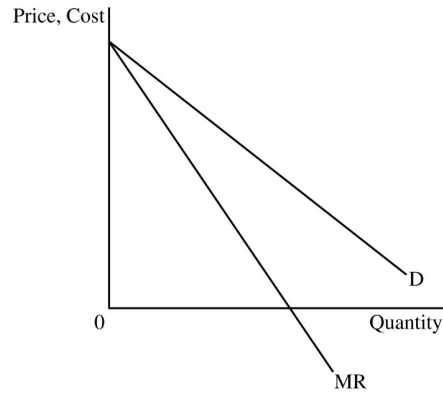
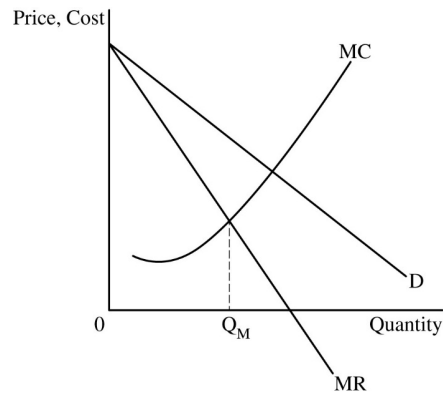


Question 1: Long**10 points**

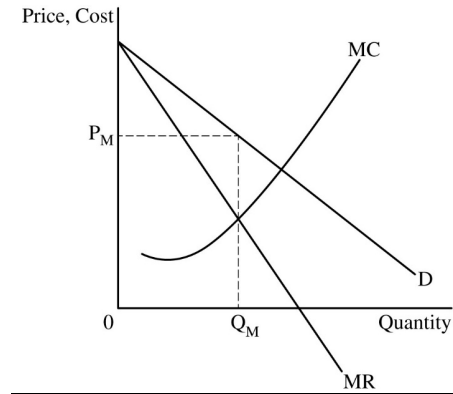
- A** Draw a correctly labeled graph for Voda Reservoir with a downward-sloping demand (D) curve and a downward-sloping marginal revenue (MR) curve with the MR curve below the D curve. **1 point**
- Point 1



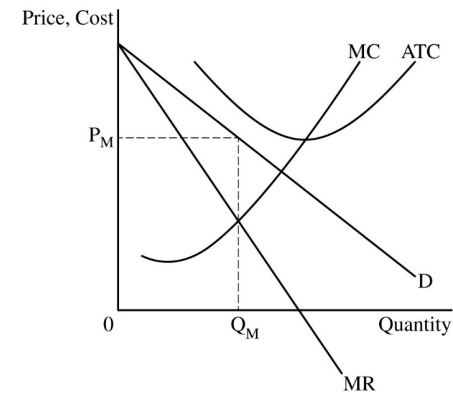
- Point 2 The graph must show a rising marginal cost (MC) curve and the profit-maximizing quantity, labeled Q_M , where $MR = MC$. **1 point**



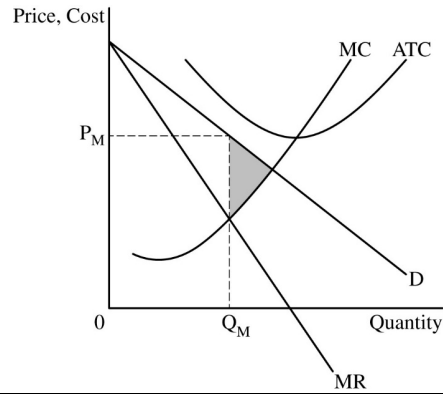
- Point 3 The graph must show the profit-maximizing price, labeled P_M , from the D curve at Q_M . **1 point**



- 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**

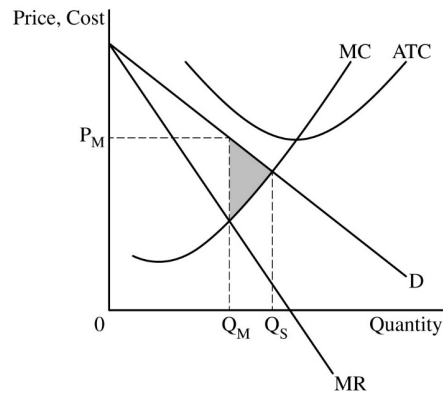


Point 5 The graph must show the area of deadweight loss, shaded completely. **1 point**



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**

Point 6



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 **1 point**

Point 9

increase in demand for bottled water will increase the price and marginal revenue of bottled water, increasing the marginal revenue product of labor.

(ii) State that the market wage will increase in the short run and explain that the new **1 point**

Point 10

regulation will decrease the supply of workers.

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

5 points

Question 3: Short

(a)	Calculate the total economic surplus as \$960 and show the work.	1 point
	Total Economic Surplus = $\frac{1}{2} \times (\$150 - \$30) \times (16 - 0) = \frac{1}{2} \times \$120 \times 16 = \$960$	
(b)	State that the quantity of backpacks purchased will decrease and explain that the price ceiling causes a decrease in the quantity supplied of backpacks and the quantity purchased in the market will be limited by the quantity supplied (8), which is less than the equilibrium quantity (16).	1 point
(c) (i)	State the price consumers pay per backpack after the per-unit subsidy is \$75.	1 point
(ii)	Calculate the total cost of the subsidy to the government as \$600 and show the work. Total Cost of Subsidy to the Government = Per-unit Subsidy $\times$ Quantity of Backpacks Total Cost of Subsidy to the Government = $\$30 \times 20 = \600	1 point
(iii)	State the deadweight loss will increase and explain with ONE of the following.	1 point
	- The per-unit subsidy causes the new equilibrium quantity (20 backpacks) to be greater than the allocatively efficient quantity (16 backpacks). - The per-unit subsidy causes the marginal cost (\$105) to be greater than the marginal benefit (\$75) at the new equilibrium quantity (20 backpacks).	
Total for part (c)		3 points
Total for question 3		5 points

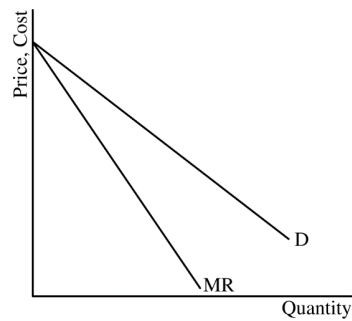
5 points

Question 3: Short

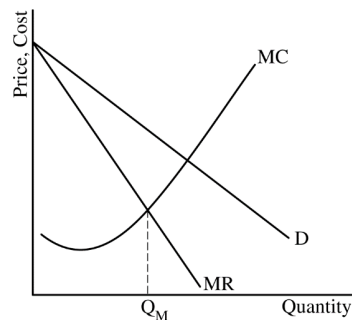
(a)	State yes and explain that this firm is a natural monopoly because it experiences decreasing average total costs over the entire effective demand for its product.	1 point
(b)	State the area of deadweight loss is equal to ONE of the following areas:	1 point
	- bfg $\frac{1}{2} \times (P_5 - P_1) \times (Q_4 - Q_2)$	
(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 cjb 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**

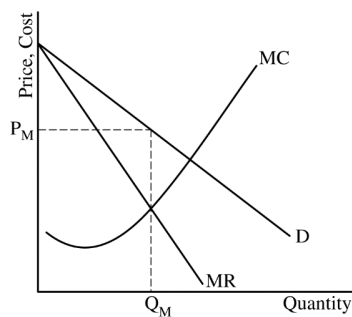
- (a) Draw a correctly labeled graph for SkyRunner Airlines showing downward sloping demand (D) and marginal revenue (MR) curves with the MR curve below the demand curve. **1 point**



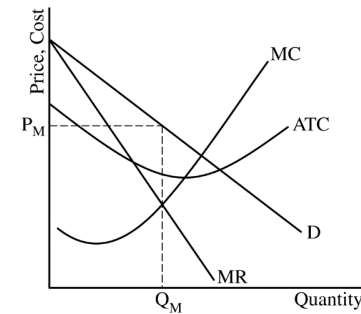
For the second point, the graph must show the marginal cost (MC) curve and the profit-maximizing quantity, labeled Q_M , where $MR=MC$. **1 point**



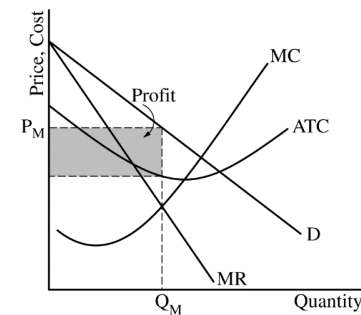
For the third point, the graph must show the profit-maximizing price, labeled P_M , from the demand curve at Q_M . **1 point**



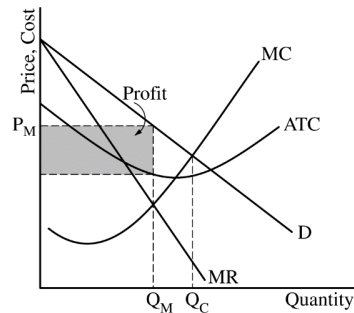
For the fourth point, the graph must show the ATC curve below the demand curve at Q_M with the MC curve rising and intersecting the ATC at its minimum point. **1 point**



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

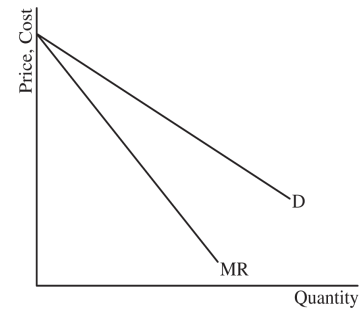
Total for part (c) 4 points

Total for question 1 10 points

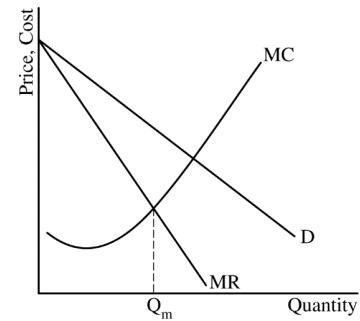
Question 1: Long

10 points

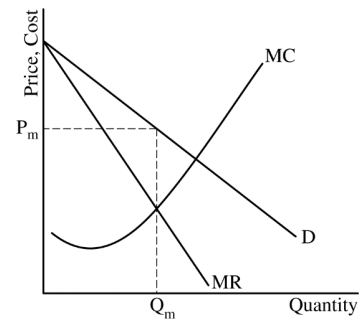
- (a) Draw a correctly labeled graph for NCHart showing downward-sloping demand (D) and marginal revenue (MR) curves with the marginal revenue curve below the demand curve. **1 point**



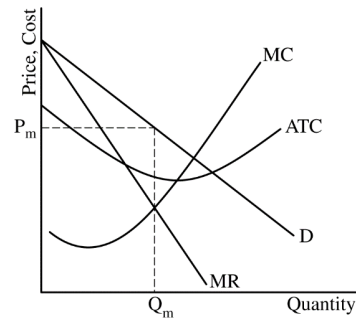
- For the second point, the graph must show the marginal cost (MC) curve and the profit-maximizing quantity, labeled Q_m , where $MR=MC$. **1 point**



- For the third point, the graph must show the profit-maximizing price, labeled P_m , above Q_m from the demand curve. **1 point**

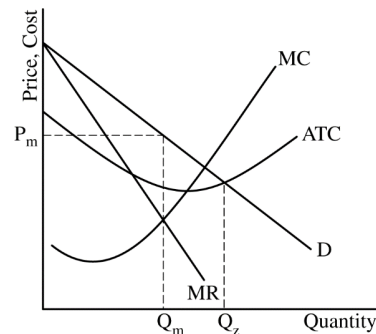


For the fourth point, the graph must show the ATC below the demand curve at Q_m with the MC curve rising and intersecting the ATC curve at its minimum.

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

(b) State that demand is elastic and explain that MR is positive at Q_m or that Q_m is less than the quantity at which marginal revenue equals zero. **1 point**

(c) (i) On your graph from part (a), show the quantity that is consistent with the goal of NCHart generating enough revenue to cover its total costs labeled as Q_z . **1 point**



(ii) State there is a deadweight loss at Q_z and explain that P (or D) $<$ MC , as shown. **1 point**

Note: Deadweight loss will exist at Q_z if the demand is drawn such that the quantity at which $D=ATC$ is less than the quantity at which $D=MC$, because P (or D) $>$ MC .

Note: Deadweight loss will NOT exist at Q_z if the demand is drawn such that the quantity at which $D=ATC$ is equal to the quantity at which $D=MC$, because P (or D) $= MC$.

Total for part (c) 2 points

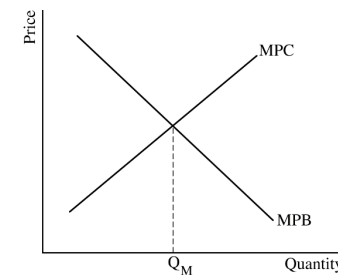
(d) (i) State that no, TXDrug does not have a dominant strategy, and explain that if NCHart chooses Q_m , then TXDrug's best response is to Enter because $\$1 > \0 , but if NCHart chooses Q_z , then TXDrug's best response is to Stay Out because $\$0 > -\1 . **1 point**

(ii) State that the best response for NCHart is to produce Q_m . **1 point**

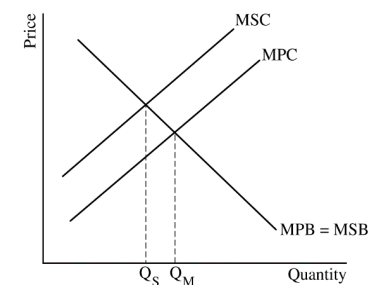
(iii) Identify the Nash equilibrium as NCHart produces Q_m and TXDrug chooses to Enter. **1 point**

Total for part (d) 3 points**Total for question 1 10 points****Question 2: Short****5 points**

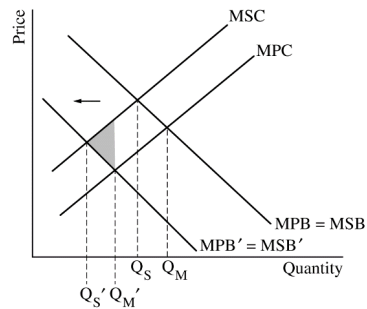
(a) Draw a correctly labeled graph with an upward-sloping supply curve labeled MPC, a downward-sloping demand curve labeled MPB, and the market equilibrium quantity labeled Q_M . **1 point**



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 Microeconomics: 2018

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AP Microeconomics

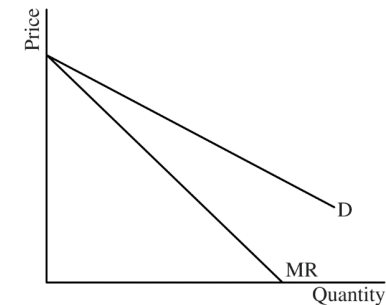
Scoring Guidelines

2018 SCORING GUIDELINES

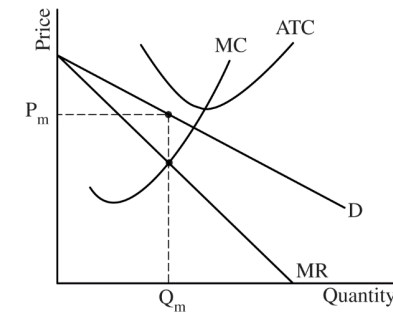
Question 1

9 points (5 + 1 + 1 + 2)

(a) 5 points:



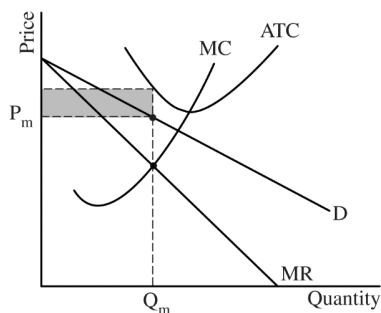
- One point is earned for drawing a correctly labeled graph for a monopoly showing a downward sloping demand (D) curve with the marginal revenue (MR) curve below the demand curve.



- 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:

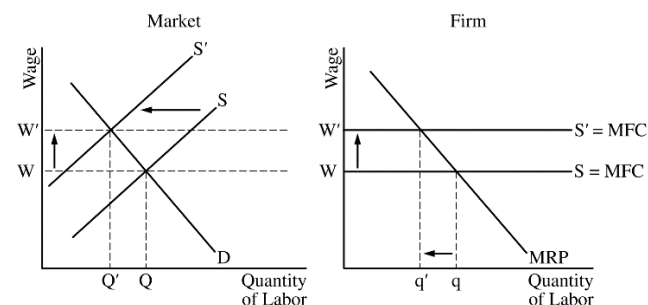
- One point is earned for stating that total revenue will decrease and explaining with one of the following reasons.
 - The monopolist is operating on the elastic portion of the demand curve.
 - The quantity effect is greater than the price effect.
 - The percentage change in quantity demanded is greater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

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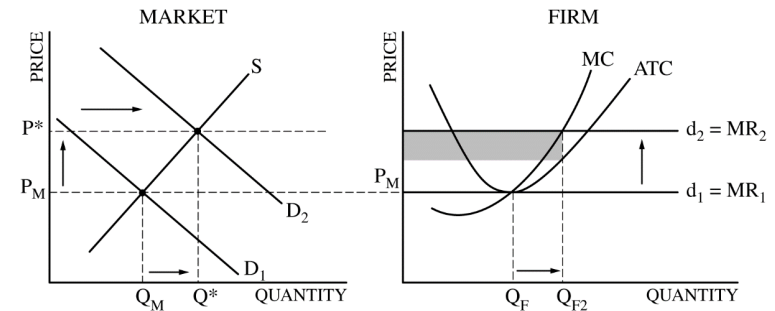
AP Microeconomics

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:

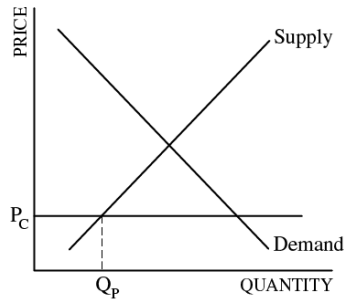
- One point is earned for stating that the market quantity will increase and the market's price will decrease in the long run, and for explaining that new corn farmers will enter the market, which will increase the market supply curve.

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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2014 Scoring Guidelines

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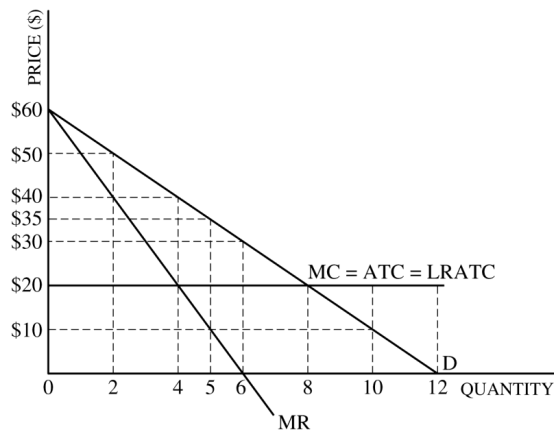
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2014 SCORING GUIDELINES

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.

$$\pi = (P - ATC) \times Q = (\$40 - \$20) \times 4 = \$80$$

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.
 $DWL = 1/2 (\$20 - \$10) \times (10 - 8) = \$5$
Other correct calculations are acceptable.

2014 SCORING GUIDELINES

Question 1 continued

1 point:

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

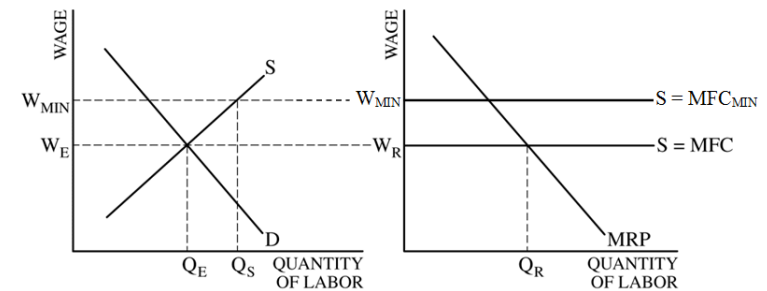
2 points:

- 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.

2014 SCORING GUIDELINES

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_{MIN} and for explaining that the firm is a wage taker in the labor market and/or the market sets the wage.

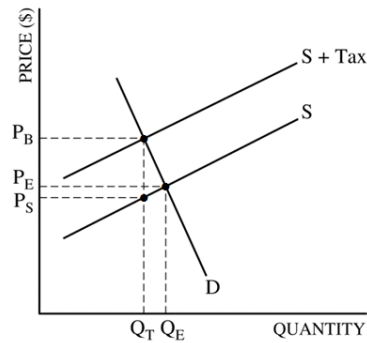
3 points:

- 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 + 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.