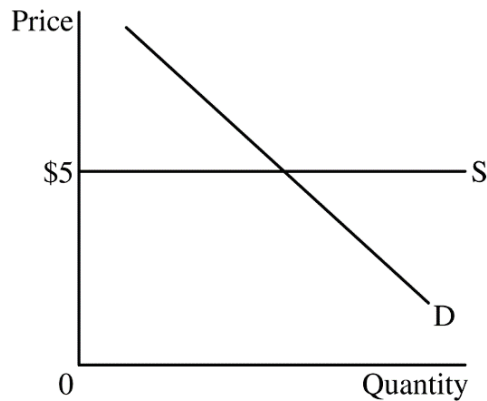


Question 3: Short**5 points**

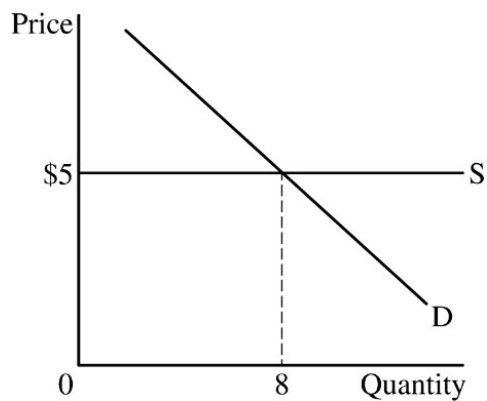
A Point 1	State that Lucy will maximize her total utility by consuming 5 units of Good X and 4 units of Good Y.	1 point
B Point 2	Calculate Lucy's total utility of consuming 2 units of Good X and 2 units of Good Y as 88 utils and show your work. Total Utility from consuming 2 units of Good X = 20 utils + 16 utils = 36 utils Total Utility from consuming 2 units of Good Y = 28 utils + 24 utils = 52 utils Total Utility from consuming 2 units of Good X and 2 units of Good Y = 36 utils + 52 utils = 88 utils	1 point
C Point 3	(i) State that Lucy can purchase a maximum of 4 units of Good Y.	1 point
(ii) Point 4	State that Lucy's optimal consumption is 4 units of Good X and 3 units of Good Y and explain that at this combination, the marginal utility per dollar spent on the last unit of Good X is 4 utils/\$ (= 8 utils/\$2), and the marginal utility per dollar spent on the last unit of Good Y is 4 utils/\$ (= 16 utils/\$4) when Lucy spends her entire budget of \$20 (= \$2 × 4 units of Good X + \$4 × 3 units of Good Y).	1 point
D Point 5	State that goods X and Y are substitute goods and explain that the cross-price elasticity of demand between Good X and Good Y is positive. A positive cross-price elasticity indicates that an increase (a decrease) in the price of Good X will increase (decrease) the demand; therefore, the quantity demanded of a substitute good, Good Y.	1 point

Question 3: Short**5 points**

- (a) Draw a correctly labeled graph of the market with a downward-sloping demand (D) curve and a perfectly elastic supply (S) curve at a price of \$5. **1 point**



For the second point, the graph must show the equilibrium quantity as 8 units. **1 point**

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

- (b) (i) Calculate the magnitude of the price elasticity of demand as 1.25 and show your work. **1 point**

$$\text{Price Elasticity of Demand} = \frac{\text{Percentage Change in Quantity Demanded}}{\text{Percentage Change in Price}}$$

$$= \frac{\left| \left(\frac{4-8}{8} \right) \times 100 \right|}{\left| \left(\frac{7-5}{5} \right) \times 100 \right|} = \frac{50\%}{40\%} = 1.25$$

OR

$$= \frac{\left(\frac{4-8}{8} \right) \times 100}{\left(\frac{7-5}{5} \right) \times 100} = \frac{-50\%}{40\%} = -1.25$$

- (ii) State that demand is elastic. **1 point**

Total for part (b) 2 points

- (c) State no and explain that Emily's marginal benefit should be greater than or equal to the price she is willing to pay (\$7) for the second unit. **1 point**

Total for question 3 5 points

Question 3: Short**5 points**

- (a) Calculate the total net benefit of placing three advertisements as \$2,200 and show your work: **1 point**

$$\text{Total net benefit} = \$3,000 - \$800 = \$2,200$$

- (b) Calculate the marginal net benefit of the third advertisement as \$500 and show your work: **1 point**

$$\text{Marginal net benefit} = (\$3,000 - \$2,200) - (\$800 - \$500) = \$800 - \$300 = \$500$$

- (c) Identify the optimal number of advertisements as 4 and explain that the marginal net benefit of the 4th advertisement is positive ($\$600 - \$500 = \$100$), but the marginal net benefit of the 5th advertisement is negative ($\$400 - \$800 = -\$400$). **1 point**

- (d) Identify the optimal number of advertisements as 4. **1 point**

- (e) State that AZY Foods is operating in a monopolistically competitive market structure. **1 point**

Total for question 3 5 points**2019****AP[®]****CollegeBoard**

AP[®] Microeconomics

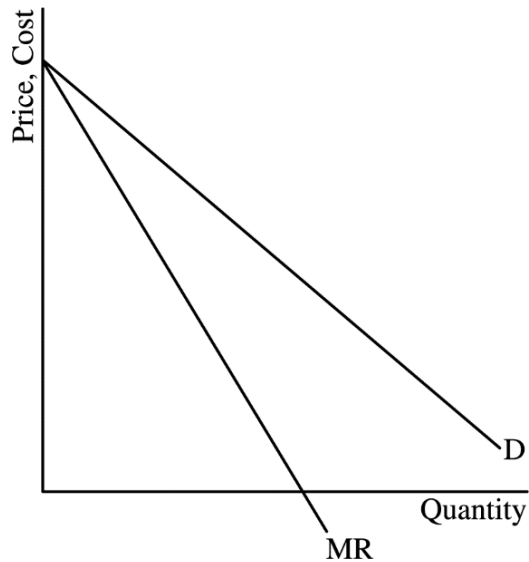
Scoring Guidelines

Set 1

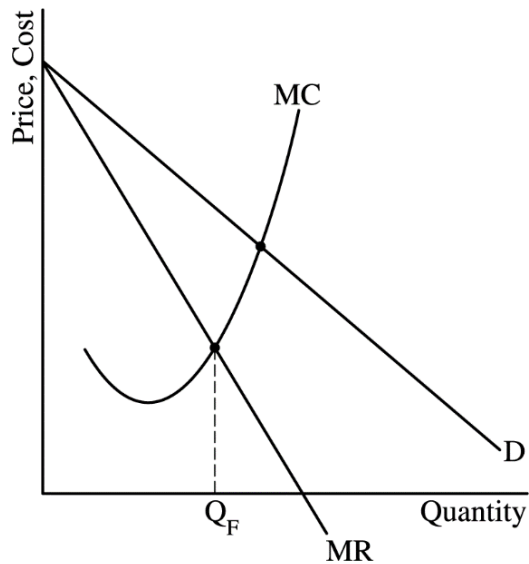
2019 SCORING GUIDELINES**Question 1****9 points (5 + 2 + 2)**

(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.

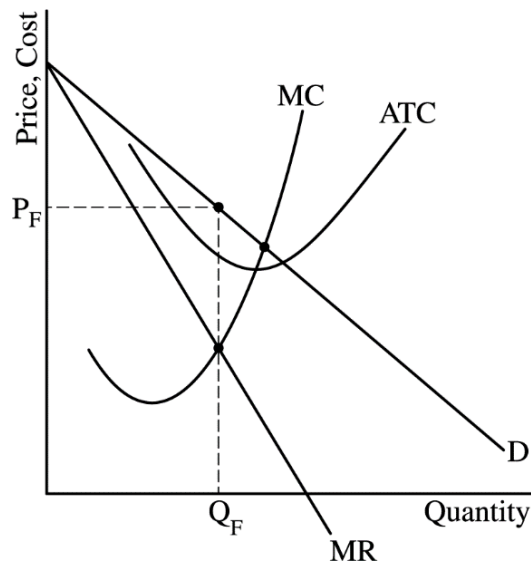


- One point is earned for showing the profit-maximizing quantity, labeled Q_F , where $MR = MC$.

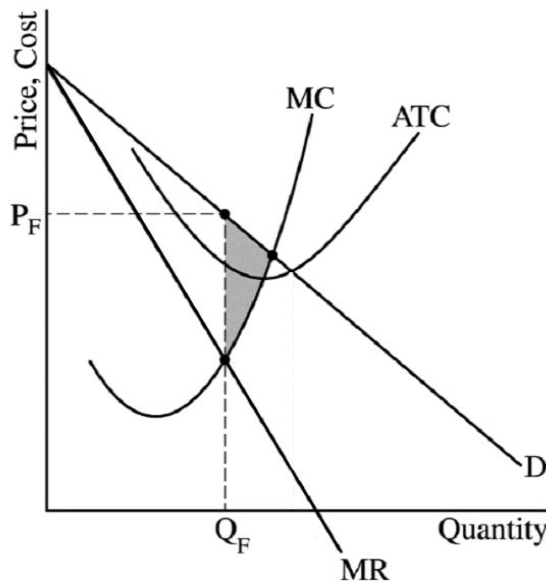


2019 SCORING GUIDELINES**Question 1 (continued)**

- One point is earned for showing the profit-maximizing price, labeled P_F , from the demand curve at Q_F , and above the average total cost curve (ATC).

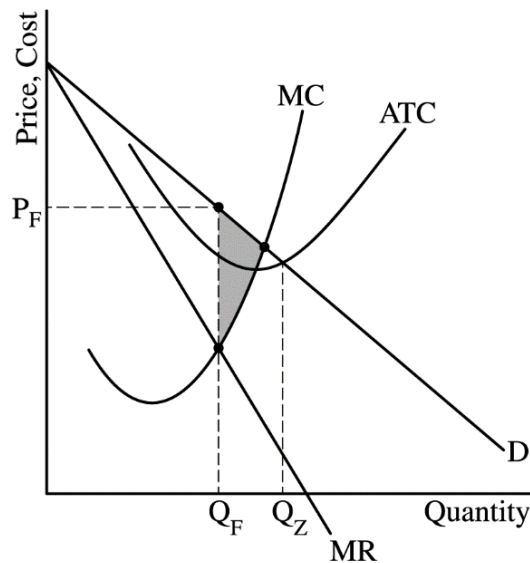


- One point is earned for completely shading the area representing the deadweight loss.



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

- One point is earned for showing the quantity where economic profits are zero, labeled Q_Z , where ATC intersects the demand curve.



(b) 2 points

- One point is earned for stating the deadweight loss will remain unchanged, and for explaining that changes in fixed costs do not affect MC or do not change the profit-maximizing quantity of the firm.
- One point is earned for stating that FillUp's economic profit will decrease.

(c) 2 points

- One point is earned for stating that the price must be greater than AVC at the profit-maximizing level of output.
- One point is earned for stating that the profit-maximizing quantity and price will both decrease.

2019 SCORING GUIDELINES**Question 2****5 points (1 + 1 + 3)**

(a) 1 point:

- One point is earned for calculating Dana's total benefit from purchasing 2 bottles of water and 1 unit of good X as \$66 and for showing the work.

$$\$24 + \$18 + \$24 = \$66 \text{ OR } \$42 + \$24 = \$66$$

(b) 1 point:

- One point is earned for calculating Dana's total consumer surplus from purchasing 3 units of good X as \$39 and for showing the work.

$$(\$24 - \$5) + (\$18 - \$5) + (\$12 - \$5) = \$39 \text{ OR } \$54 - \$15 = \$39$$

(c) 3 points:

- One point is earned for explaining that Dana does not maximize her benefit because the marginal benefit per dollar spent on bottles of water is greater than the marginal benefit per dollar spent on good X.

$$(18/\$3 > 6/\$6; \text{ OR } 6 > 1; \text{ OR } 6 \neq 1; \text{ OR } MB_w/P_w > MB_x/P_x)$$

- One point is earned for stating that the optimal quantities of good X and bottles of water are 3 units and 4 bottles respectively.
- One point is earned for correctly determining the optimal quantity of water, calculating the cross-price elasticity of demand for bottles of water with respect to the price of good X, showing the work, and for stating that the goods are complements. Answer must be consistent with (c)(ii).

$$\begin{aligned} & (\% \text{ change in the quantity of bottles of water})/(\% \text{ change in the price of good X}) \\ & = (25\%/-50\%) = -0.5 \end{aligned}$$

(Using the midpoint formula is also acceptable: $(1/4.5)/(-3/4.5) = -0.33$)

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

(a) 1 point

- One point is earned for stating the actions that maximize the combined profits are for Patrick's Pie to "Advertise" and for Dee's Pizzeria to "Stay Out."

(b) 1 point

- One point is earned for stating that neither firm has an incentive to cheat and for explaining that Dee's Pizzeria profits would decrease from \$0 to -\$2 if Dee cheated and that Patrick's Pie's profits would decrease from \$175 to \$100 if Patrick cheated.

(c) 1 point

- One point is earned for stating that Patrick's Pie does not have a dominant strategy.

(d) 1 point

- One point is earned for stating two Nash equilibria as:
 - Patrick's Pie "Do Not Advertise" and Dee's Pizzeria "Enter"
 - Patrick's Pie "Advertise" and Dee's Pizzeria "Stay Out"

(e) 2 points

- One point is earned for correctly redrawing the payoff matrix and showing the effect of the side payment.

		Dee's Pizzeria	
		Enter	Stay Out
Patrick's Pie	Advertise	\$50, -\$2	\$155, \$20
	Do Not Advertise	\$150, \$15	\$80, \$20

- One point is earned for stating that the Nash equilibrium is for Patrick's Pie to "Advertise" and for Dee's Pizzeria to "Stay Out."

2018**AP[®]** **CollegeBoard**

AP Microeconomics

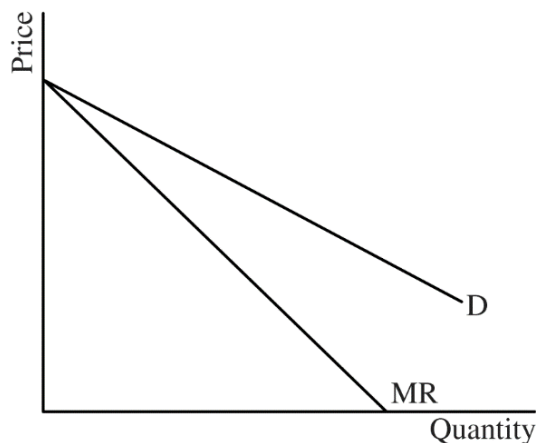
Scoring Guidelines

2018 SCORING GUIDELINES

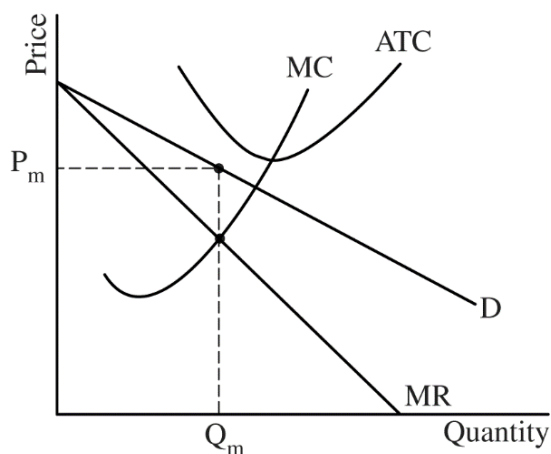
Question 1

9 points (5 + 1 + 1 + 2)

(a) 5 points:



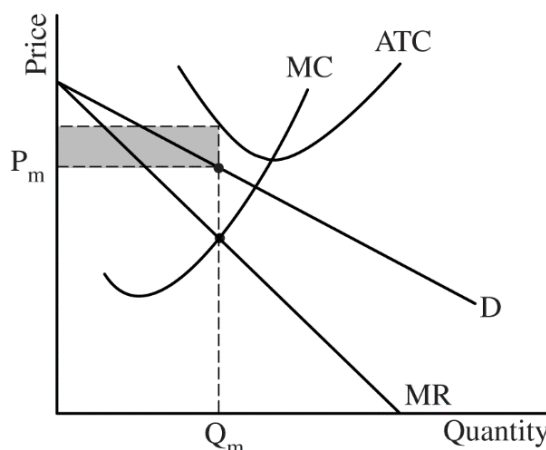
- One point is earned for drawing a correctly labeled graph for a monopoly showing a downward sloping demand (D) curve with the marginal revenue (MR) curve below the demand curve.



- 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:

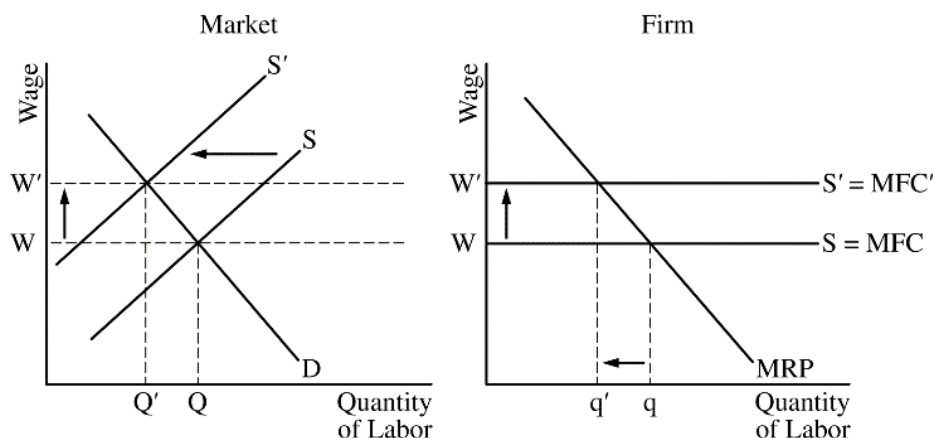
- One point is earned for stating that total revenue will decrease and explaining with one of the following reasons.
 - The monopolist is operating on the elastic portion of the demand curve.
 - The quantity effect is greater than the price effect.
 - The percentage change in quantity demanded is greater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

AP[®] Microeconomics 2016 Scoring Guidelines

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2016 SCORING GUIDELINES

Question 1

10 points (3+3+4)

(a) 3 points:

- One point is earned for stating that the quantity supplied exceeds the quantity demanded at the price floor or the price floor would result in a surplus because the price floor is binding or effective.
- One point is earned for correctly calculating the price elasticity of supply.
Students can use either the midpoint formula or the point elasticity formula.

$$E = (500/1250) / (0.2/1.1) = 2.2$$

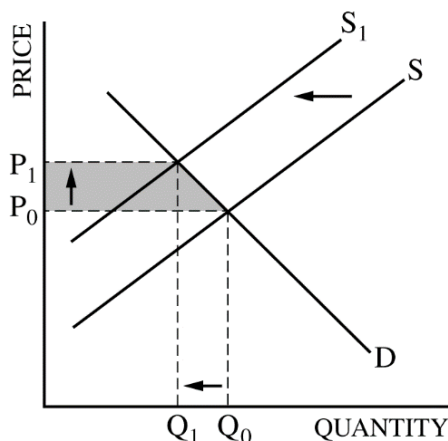
$$E = (50\%/20\%) = 2.5$$

$$E = (500/0.2) \times (1/1000) = 2.5$$

$$E = [(1500-1000)/1000] / [(1.2-1)/1] = 0.5/0.2 = 2.5$$

$$E = (500/0.2) \times (1.2/1500) = 2$$
- One point is earned for stating that the supply is elastic and for explaining that the percentage change in quantity supplied exceeds the percentage change in price or because price elasticity of supply is greater than one. (Other equivalent explanations are accepted.)

(b) 3 points:



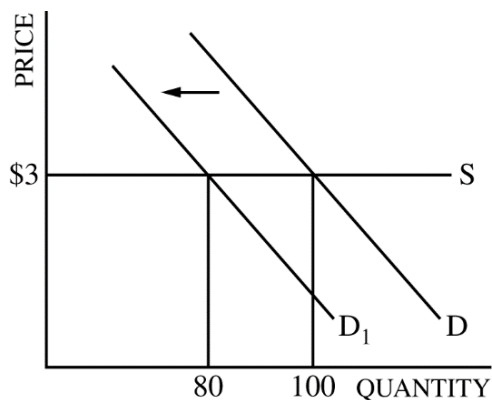
- One point is earned for drawing a correctly labeled graph and for showing the equilibrium price and quantity, labeled P_0 and Q_0 , respectively.
- One point is earned for shifting the supply curve to the left and for showing the new equilibrium price and quantity, labeled P_1 and Q_1 , respectively.
- One point is earned for completely shading on the graph the area representing the change in consumer surplus.

2016 SCORING GUIDELINES

Question 1 (continued)

(c) 4 points:

- One point is earned for stating that coffee and muffins are complementary goods.



- One point is earned for drawing a correctly labeled graph for the coffee market and showing a horizontal supply curve (S) and a downward sloping demand curve (D).
- One point is earned for shifting the demand curve to the left and for showing a decrease in the equilibrium quantity and no change in the equilibrium price of coffee.
- One point is earned for correctly calculating the new equilibrium quantity and showing the work.

$$\% \Delta Q = (10\% \times -2) = -20\%$$

$$\text{New Equilibrium Quantity} = 100 \times (-20\%) = 80$$
 OR

$$\text{New Equilibrium Quantity} = 100 - (0.2 \times 100) = 80$$

(Using the midpoint formula is also acceptable.)

2016 SCORING GUIDELINES

Question 2

7 points (1+1+1+1+3)

(a) 1 point:

- One point is earned for stating that the marginal benefit is \$1.

(b) 1 point:

- One point is earned for correctly calculating the total consumer surplus from consuming 5 units of X.

$$CS = (\$16 - \$4) + (\$12 - \$4) + (\$8 - \$4) + (\$4 - \$4) + (\$1 - \$4) = \$21$$

OR

$$CS = \$41 - \$20 = \$21$$

(c) 1 point:

- One point is earned for explaining that this combination of X and Y is not optimal because the marginal benefit per dollar of good X ($MB_x/P_x = \$4/\$4 = 1$) is less than the marginal benefit per dollar of good Y ($MB_y/P_y = \$8/\$2 = 4$). (This can also be stated as $MB_x/MB_y < P_x/P_y$.)

$(MB_x/P_x = 1)$ is not equal to $(MB_y/P_y = 4)$ is acceptable.

MB_x/P_x is less than MB_y/P_y is acceptable.

MB_y/P_y is greater than MB_x/P_x is acceptable.

(d) 1 point:

- One point is earned for stating that Martha's optimal combination is 3 units of X and 4 units of Y.

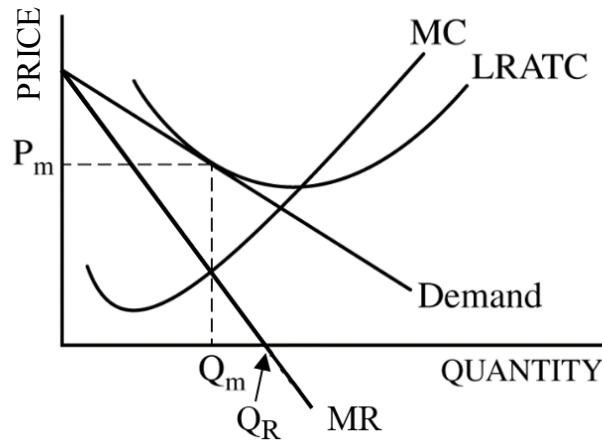
(e) 3 points:

- One point is earned for stating that the optimal quantity of good Y will decrease.
- One point is earned for stating that the optimal quantity of good Y will decrease.
- One point is earned for stating that the optimal quantity of good Y will stay the same.

2016 SCORING GUIDELINES

Question 3

6 points (4+1+1)



(a) 4 points:

- One point is earned for drawing a correctly labeled graph showing a downward sloping demand curve with MR curve below the demand curve.
- One point is earned for showing the quantity, Q_m , at $MC=MR$
- One point is earned for showing the price, P_m , on the demand curve above Q_m
- One point is earned for showing the long-run average total cost tangent to the demand curve at Q_m .

(b) 1 point:

- One point is earned for showing Q_R at $MR=0$.

(c) 1 point:

- One point is earned for stating that firms in this market are experiencing economies of scale in long-run equilibrium because LRATC is decreasing OR because Q_m is to the left of the minimum point of the LRATC.