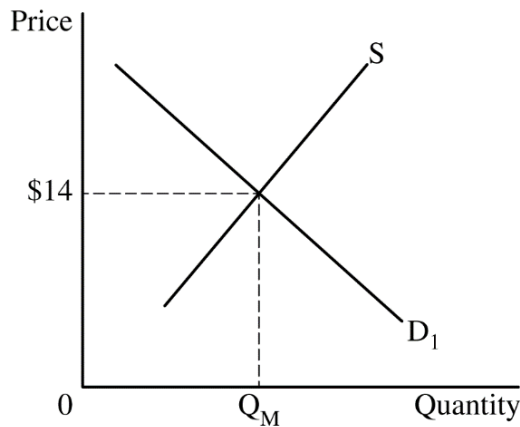


Question 3: Short**5 points**

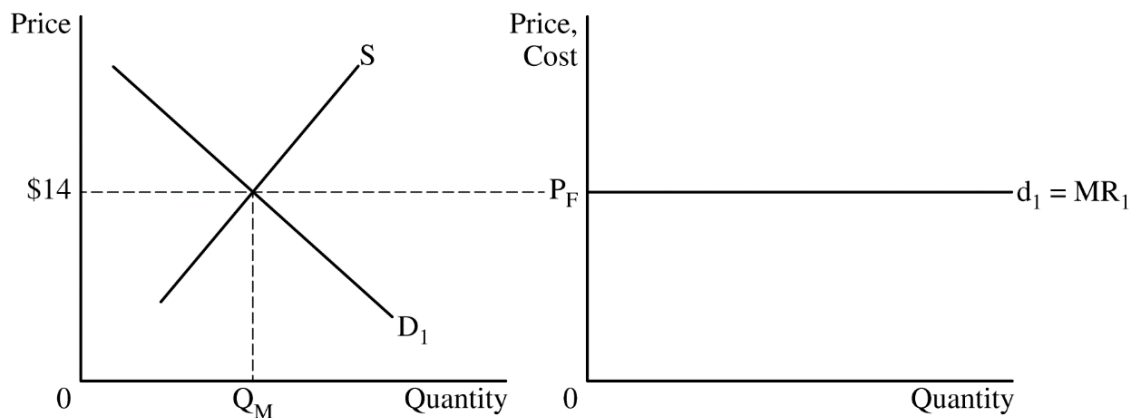
A Point 1	State that Lucy will maximize her total utility by consuming 5 units of Good X and 4 units of Good Y.	1 point
B Point 2	Calculate Lucy's total utility of consuming 2 units of Good X and 2 units of Good Y as 88 utils and show your work. Total Utility from consuming 2 units of Good X = 20 utils + 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 1: Long**10 points**

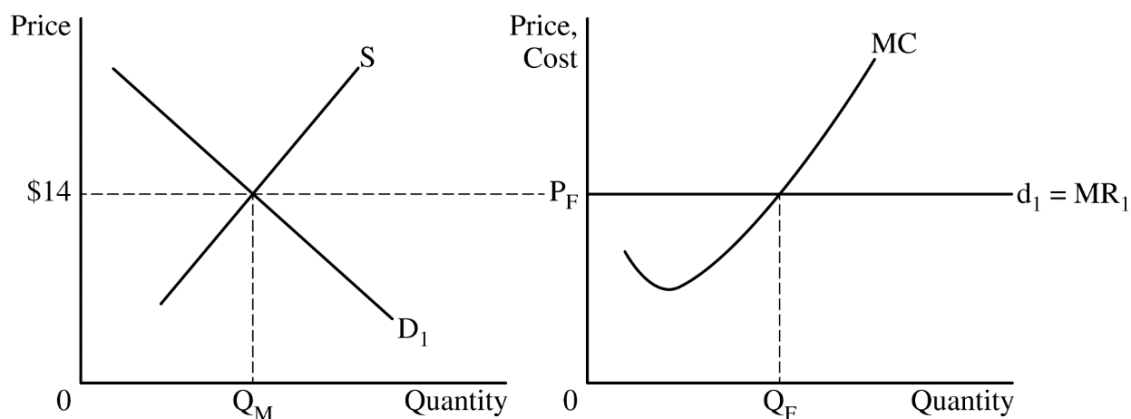
- (a) Draw a correctly labeled graph of the market for soybeans with a downward-sloping demand (D_1) curve and an upward-sloping supply (S) curve and label the market equilibrium price as \$14 and the market equilibrium quantity as Q_M . **1 point**



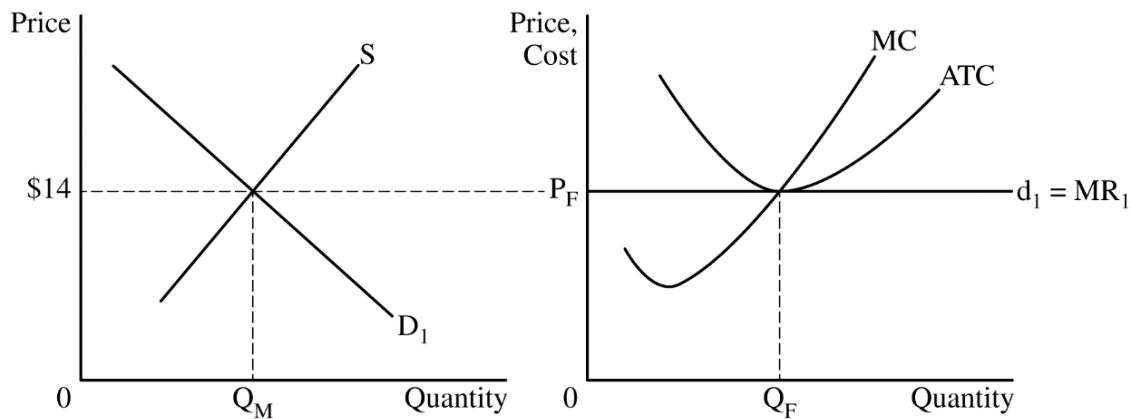
- For the second point, draw a correctly labeled graph of Soja Farm and show the firm's horizontal demand and marginal revenue ($d_1=MR_1$) curve extended from the market equilibrium price and label the firm's price as P_F . **1 point**



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



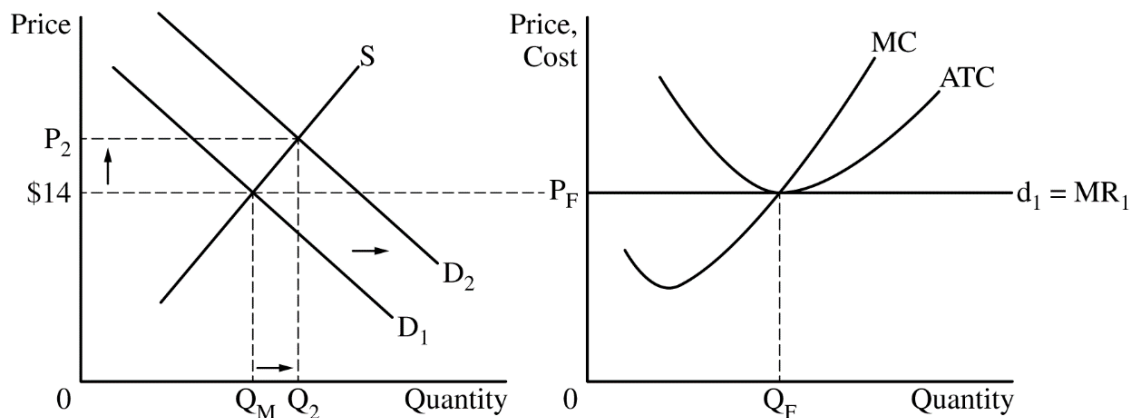
For the fourth point, the firm's graph must show the average total cost (ATC) curve tangent to the firm's demand curve at Q_F and show the MC curve passing through the minimum point of the ATC curve.

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

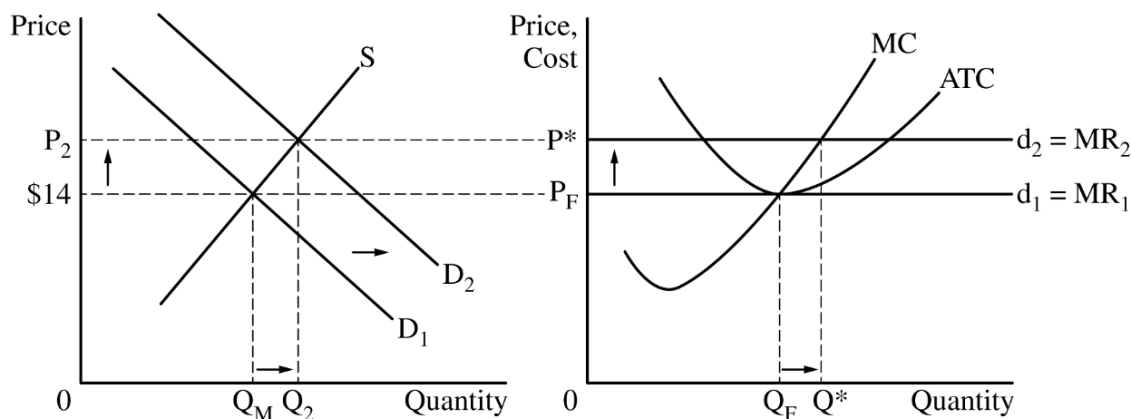
- (b)** State that Soja Farm's total revenues would decrease to \$0 and explain that all consumers of soybeans would buy soybeans from other sellers who charge the market price of \$14.

1 point

- (c) (i)** The market graph from part (a) must show a rightward shift of the market demand curve and the new equilibrium price labeled P_2 and the new equilibrium quantity labeled Q_2 .

1 point

- (ii)** The firm's graph from part (a) must show an upward shift in the firm's marginal revenue (demand) curve at P_2 and the new profit-maximizing quantity for Soja Farms, labeled Q^* .

1 point

		Total for part (c)	2 points
(d)	State that the number of firms will increase in the long run and explain that the positive economic profits earned by soybean producers will encourage new firms to enter the market.		1 point
(e) (i)	State that demand for quinoa is inelastic and explain with ONE of the following. - The absolute value of the price elasticity of demand for quinoa is 0.2. - The 5% decrease in the quantity demanded of quinoa is less than the 25% increase in the price of quinoa.		1 point
(ii)	Calculate the cross-price elasticity of demand as 0.4 and show your work.		1 point
Cross Price Elasticity of Demand = $\frac{\% \text{ Change in } Q_D \text{ of Tofu}}{\% \text{ Change in Price of Quinoa}} = \frac{10\%}{25\%} = 0.4$			
		Total for part (e)	2 points
		Total for question 1	10 points

Question 3: Short**5 points**

- (a)** Calculate the total fixed cost as \$72 and show your work. **1 point**

$$\text{Total Fixed Cost} = (\text{Average Total Cost} - \text{Average Variable Cost}) \times \text{Quantity}$$

$$\text{Total Fixed Cost} = (\$26 - \$8) \times 4 = (\$18 \times 4) = \$72$$

OR

$$\text{Total Fixed Cost} = (\$21 - \$9) \times 6 = (\$12 \times 6) = \$72$$

OR

$$\text{Total Fixed Cost} = (\$20 - \$11) \times 8 = (\$9 \times 8) = \$72$$

- (b)** Identify the price as \$14 and the profit-maximizing quantity as 6 units. **1 point**

- (c)** Calculate Hansel Hangout's economic profit at the profit-maximizing quantity as -\$42 and show your work. **1 point**

$$\text{Economic Profit} = (\text{Price} - \text{Average Total Cost}) \times \text{Quantity}$$

$$= (\$14 - \$21) \times 6 \text{ units} = (-\$7 \times 6) = -\$42$$

OR

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

$$= (\$14 \times 6) - (\$21 \times 6) = \$84 - \$126 = -\$42$$

- (d)** State that the market price of Good X will increase in the long run and explain that some firms will exit the market due to the negative economic profits, causing the market supply curve to shift to the left, increasing the market equilibrium price. **1 point**

- (e)** State that the quantity demanded of Good C will increase and explain that a positive cross-price elasticity of demand indicates that the two goods are substitutes in consumption, and an increase in the price of Good X will increase the demand for Good C, causing an increase in the quantity demanded of Good C. **1 point**

Total for question 3 5 points

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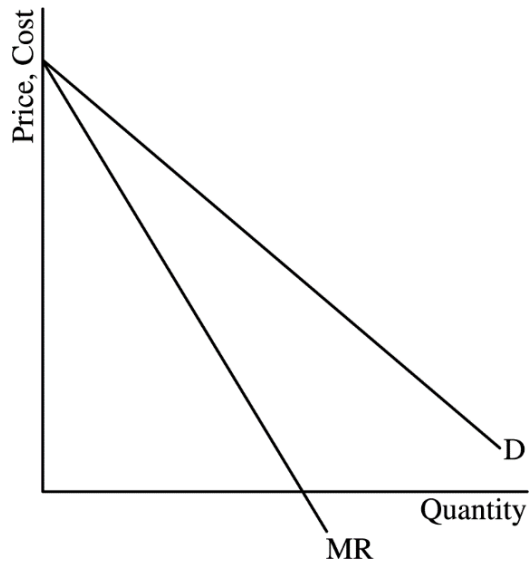
Scoring Guidelines

Set 1

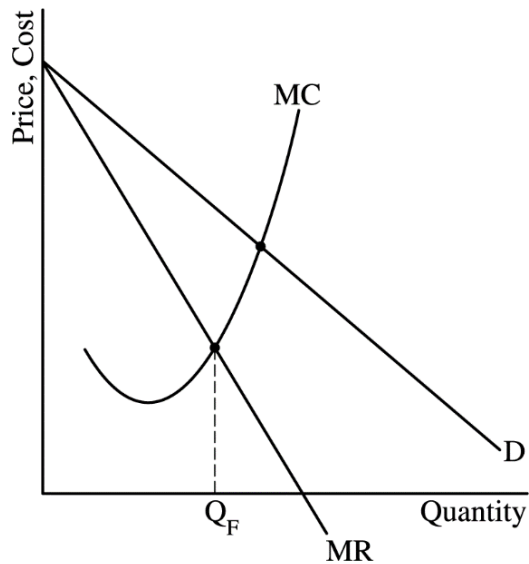
2019 SCORING GUIDELINES**Question 1****9 points (5 + 2 + 2)**

(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.

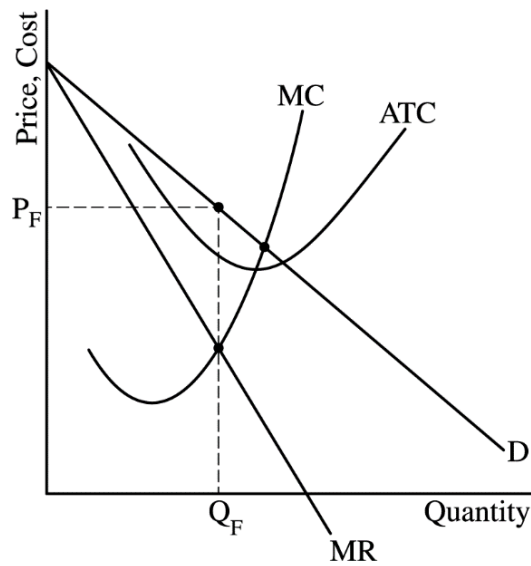


- One point is earned for showing the profit-maximizing quantity, labeled Q_F , where $MR = MC$.

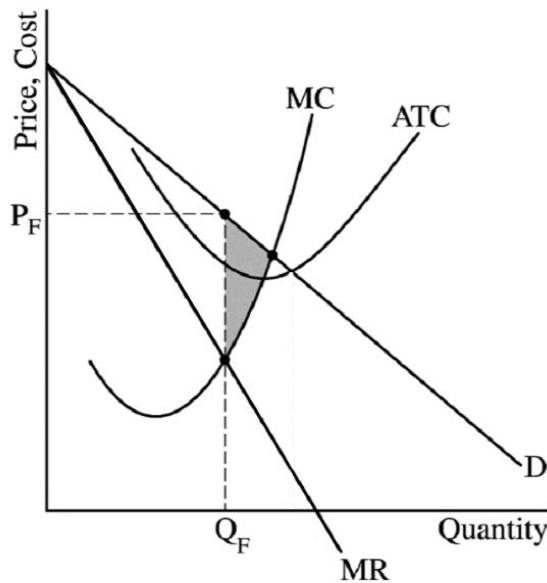


2019 SCORING GUIDELINES**Question 1 (continued)**

- 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).

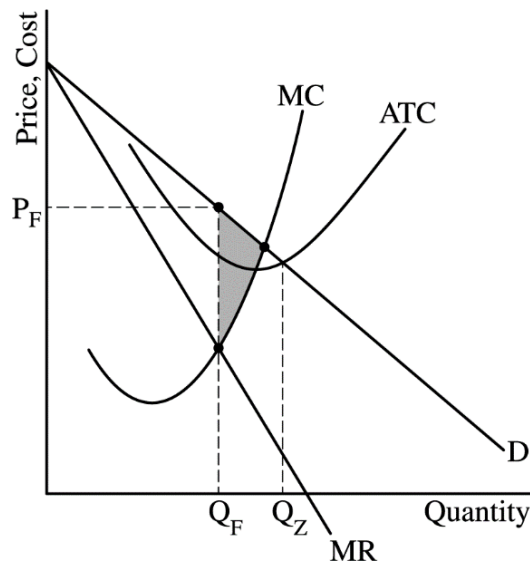


- One point is earned for completely shading the area representing the deadweight loss.



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."

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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.

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

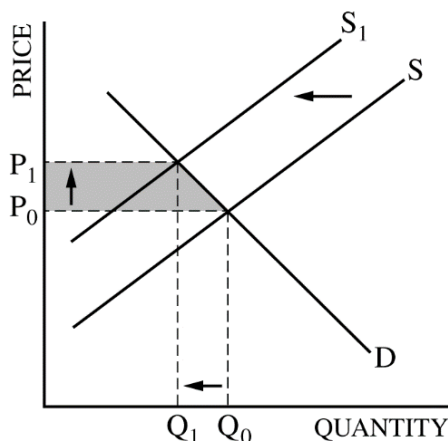
$$E = (50\%/20\%) = 2.5$$

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

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

$$E = (500/0.2) \times (1.2/1500) = 2$$
- 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:



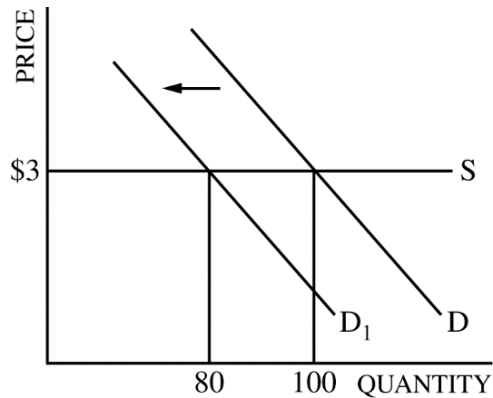
- One point is earned for drawing a correctly labeled graph and for showing the equilibrium price and quantity, labeled P_0 and Q_0 , respectively.
- One point is earned for shifting the supply curve to the left and for showing the new equilibrium price and quantity, labeled P_1 and Q_1 , respectively.
- 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.

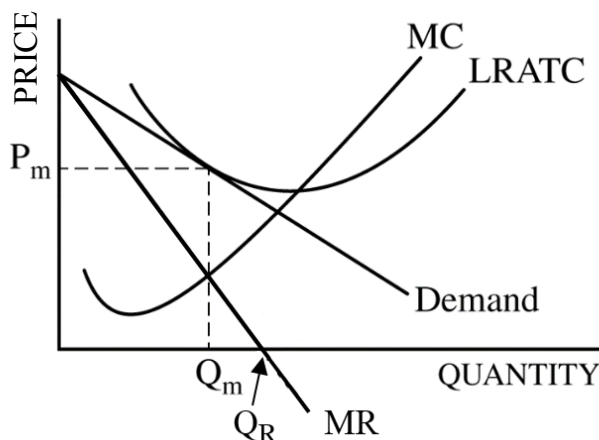
(e) 3 points:

- 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.