

2023



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# AP<sup>®</sup> Microeconomics

## Sample Student Responses and Scoring Commentary Set 1

### **Inside:**

#### **Free-Response Question 1**

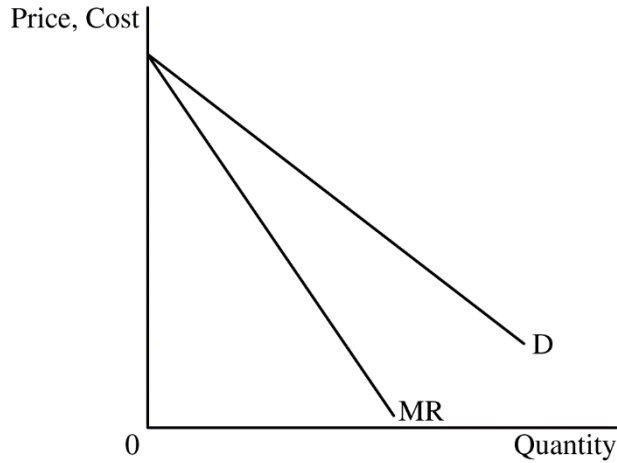
- Scoring Guidelines**
- Student Samples**
- Scoring Commentary**

**Question 1: Long**

**10 points**

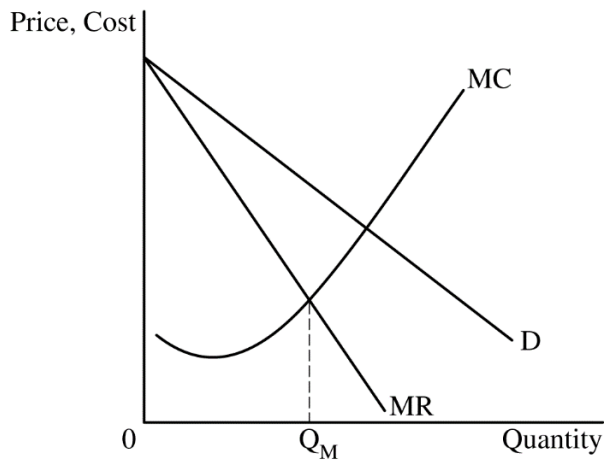
- (a) Draw a correctly labeled graph of a monopoly with a downward-sloping demand (D) curve and a downward-sloping marginal revenue (MR) curve with the MR curve below the D curve.

**1 point**



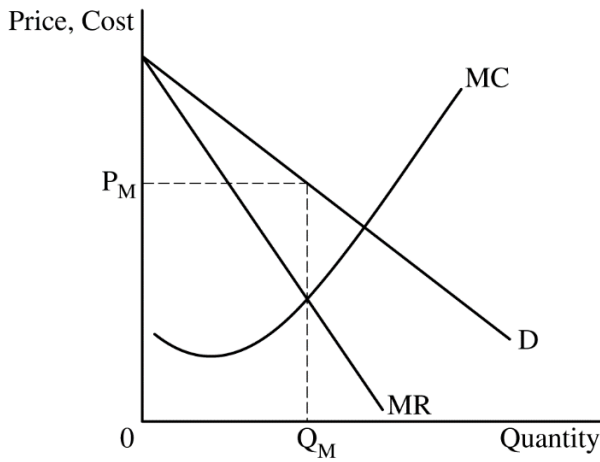
For the second point, the graph must show a marginal cost (MC) curve and the profit-maximizing quantity, labeled  $Q_M$ , where  $MR = MC$ .

**1 point**



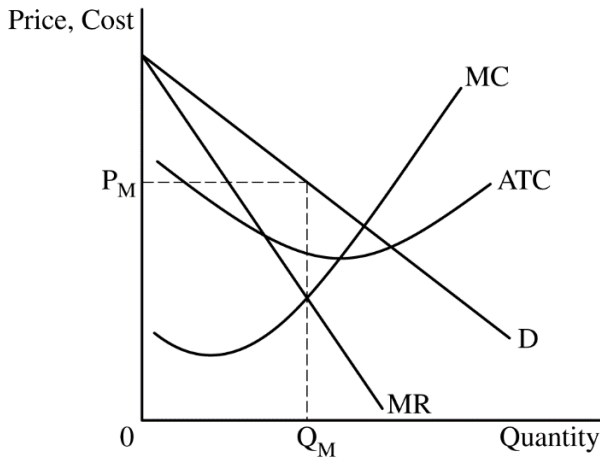
For the third point, the graph must show the profit-maximizing price, labeled  $P_M$ , from the demand curve at  $Q_M$ .

**1 point**



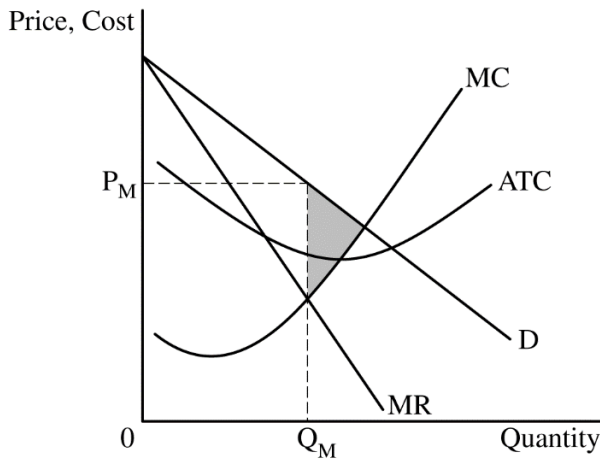
For the fourth point, the graph must show the average total cost (ATC) curve below  $P_M$  at  $Q_M$  and the MC curve passing through the minimum point of the ATC curve.

**1 point**



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

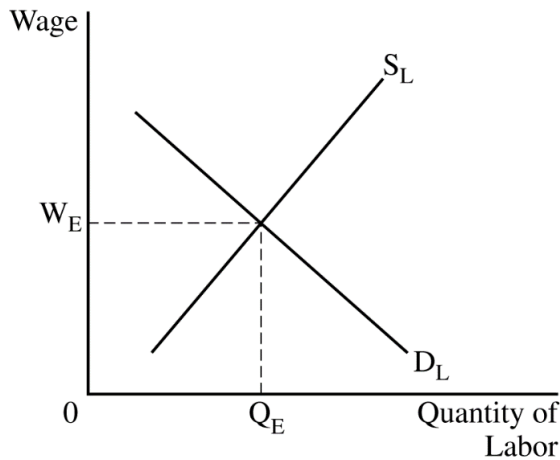
**1 point**



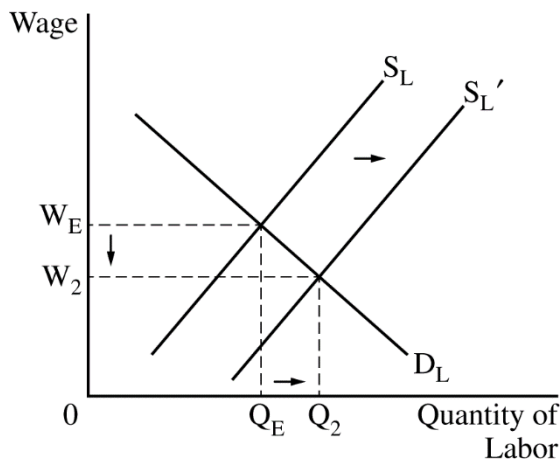
**Total for part (a) 5 points**

- |            |   |                |
|------------|---|----------------|
| <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**

Important: Completely fill in the circle that corresponds to the question you are answering on this page.

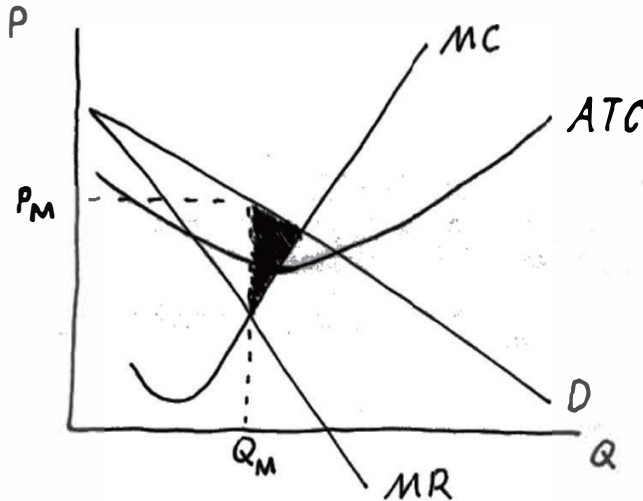
Question 1   Question 2   Question 3



Begin your response to each question at the top of a new page.

(a)

- (i)
- (ii)
- (iii)
- (iv)

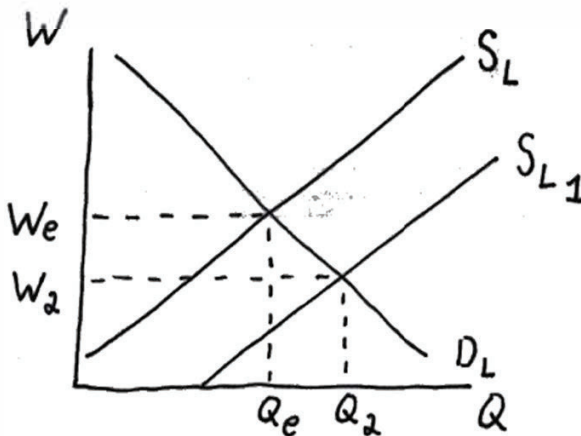


(b) Binding price ceiling

(c) RKB's profit-maximizing quantity ↓ because demand and marginal revenue will shift to the left.

(d)

- (i)
- (ii)



Page 2

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

● **Important:** Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1

Question 2

Question 3



Begin your response to each question at the top of a new page.

(iii) Wage rate = \$200

$$\frac{2500}{500} = 5$$

$$x \cdot 5 = \frac{1000}{x} \Rightarrow \frac{5x}{x} = \frac{1000}{5}$$

$$\Downarrow \\ 200$$

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

0061983

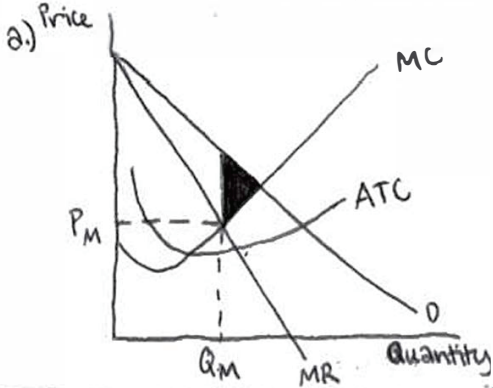


Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1    Question 2    Question 3

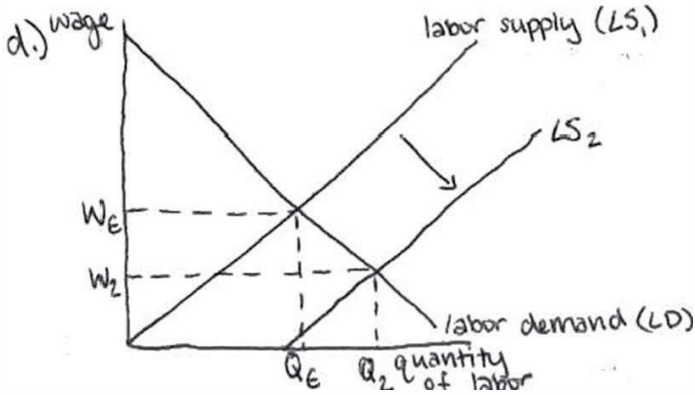


Begin your response to each question at the top of a new page.



b.) The government would produce a binding price floor for RKB to produce the allocatively efficient quantity.

c.) The profit-maximizing quantity in the short run will stay the same because it is in a monopolistic market and thus RKB is the only producer of the product.



$2,500(\$500) = 1,000(W)$   
 $\$1,250,000 = 1,000W$   
 $W = \$1,250$   
 The wage rate is \$1,250.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.



Important: Completely fill in the circle that corresponds to the question you are answering on this page.

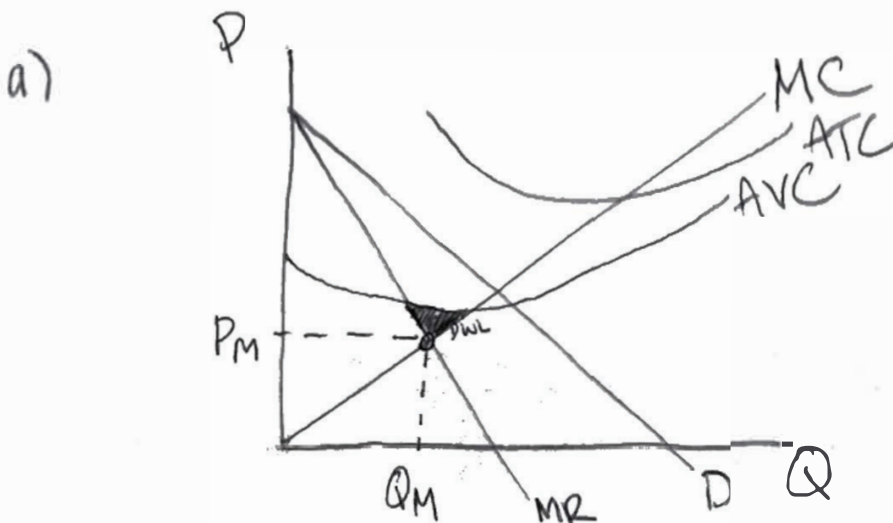
Question 1

Question 2

Question 3



Begin your response to each question at the top of a new page.



- b) The government would impose a per-unit tax to produce allocatively efficient quantity.
- c) RKB's profit-maximizing quantity in the short run will have a decrease in quantity demanded, because a loss in consumers leads to a decrease in the want for this new device.

Page 2

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

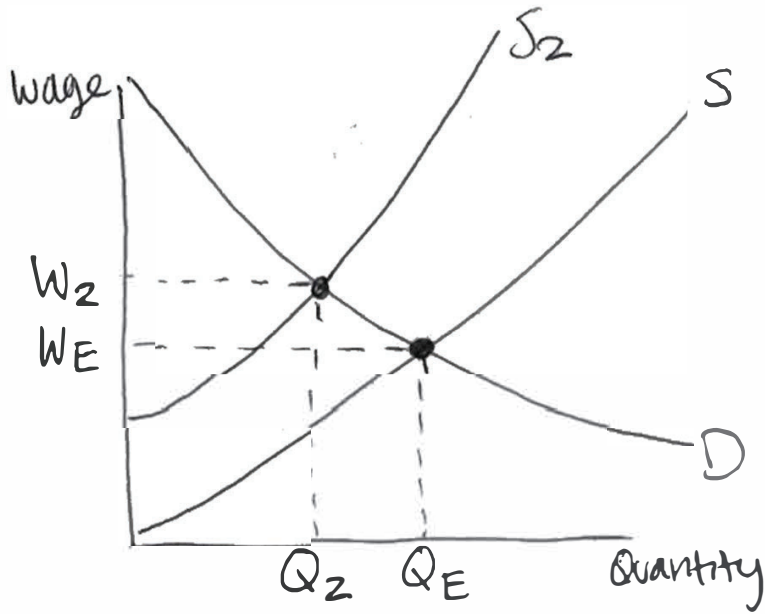
● Important: Completely fill in the circle that corresponds to the question you are answering on this page.

Question 1    Question 2    Question 3

●                    ○                    ○

Begin your response to each question at the top of a new page.

d)



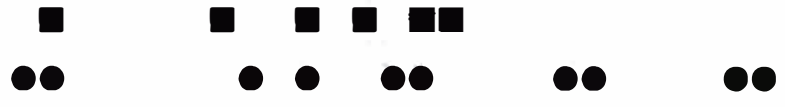
diii) 
$$\begin{array}{r} 2500 \\ - 1000 \\ \hline 1500 \end{array}$$

$$\frac{1500}{500} = 3$$

The wage rate is 3.

Use a pen with black or dark blue ink only. Do NOT write your name. Do NOT write outside the box.

0054402



## Question 1

**Note:** Student samples are quoted verbatim and may contain spelling and grammatical errors.

### Overview

The question assessed students' understanding of how a monopoly would maximize profit in the short run, the appropriate policy to improve allocative efficiency, and the effect of a change in market demand on marginal revenue and the profit-maximizing quantity of output. The question also assessed students' understanding of a perfectly competitive labor market, the effects of labor supply changes on the market equilibrium, and how to solve for the wage rate using the cost minimization formula.

The question stated that “RKB is a profit-maximizing monopoly that produces a new patented device. RKB is earning positive economic profit.” In part (a) students were asked to draw a correctly labeled graph for a monopoly earning positive economic profit. Part (a)(i) and (a)(ii) asked students to show the profit-maximizing quantity and price, respectively. The question tested students' knowledge of market conditions for a monopoly and their ability to illustrate these concepts using a graph. This task required demonstrating knowledge of revenue and cost conditions by drawing a downward-sloping demand curve (D), a downward-sloping marginal revenue curve (MR) that lies below the demand curve, and by drawing the marginal cost (MC) curve. Students were required to show that the profit-maximizing quantity ( $Q_M$ ) occurs where MR equals MC and that the profit-maximizing price ( $P_M$ ) is determined by identifying the price that corresponds to this quantity on the demand curve. These tasks required students to demonstrate marginal analysis in a graphical format. Part (a)(iii) asked students to draw the average total cost (ATC) curve consistent with the given positive economic profit condition by having the ATC curve below  $P_M$  at  $Q_M$  and with the rising MC curve passing through the minimum point of the ATC curve. Part (a)(iv) asked students to completely shade the area of deadweight loss. This task required students to demonstrate their understanding that deadweight loss exists as the area from  $Q_M$ , between MC and D, to where  $MC = D$ .

Part (b) of this question introduced students to various ways of regulating the monopolist. Students were asked to state whether a binding price ceiling, a binding price floor, a per-unit tax, or a lump-sum tax could be used to produce the allocatively efficient quantity. This task required students to demonstrate knowledge that a binding price ceiling, at the price where  $D = MC$ , would incentivize the monopolist to produce the allocatively efficient quantity.

Part (c) of this question redirected students to consider that if, instead of government regulations, consumers realize that the device harms the users' vision. Students were asked to determine what would happen to the profit-maximizing quantity of the monopolist. This task required students to state the profit-maximizing quantity would decrease and explain that the D and MR curves would decrease, causing the MR curve to intersect MC at a lower quantity.

**Question 1 (continued)**

Part (d) of the question stated, “Assume that RKB hires workers in a perfectly competitive labor market.” In part (d)(i) students were asked to draw a correctly labeled perfectly competitive labor market, requiring them to draw a downward-sloping demand for labor ( $D_L$ ) curve, an upward-sloping supply of labor ( $S_L$ ) curve, and the equilibrium wage and quantity labeled  $W_E$  and  $Q_E$ , respectively. This part of the question tested students’ knowledge of the factor market and their ability to illustrate this concept with a graph. In part (d)(ii) students were told that immigration increased the number of workers and were asked to graph the change. This task required students to illustrate that the  $S_L$  curve will increase (shift right) and cause the new equilibrium wage, labeled as  $W_2$ , to lie below  $W_E$ , and the new equilibrium quantity, labeled as  $Q_2$ , to be to the right of  $Q_E$ . In part (d)(iii) students were provided with the marginal product of the last unit of capital (MPK) and the marginal product of the last unit of labor (MPL). Students were also provided with the rental rate of capital. Students were directed to consider that the firm uses the optimal combination of capital and labor and were then directed to calculate the wage rate and show their work. This task required students to set up the cost minimization equation correctly and to calculate the wage rate as \$200.

**Sample: 1A****Score: 10**

Part (a): 5 points

The response earned the first point in part (a) because the response shows a monopoly graph with a downward-sloping demand curve (D) and a downward-sloping marginal revenue curve (MR) with the MR curve below the D curve. The response earned the second point in part (a) because the response shows a marginal cost curve (MC) and the profit-maximizing quantity  $Q_M$  where  $MR=MC$ . The response earned the third point in part (a) because the response shows the profit-maximizing price  $P_M$  from the demand curve at  $Q_M$ . The response earned the fourth point in part (a) because the response shows average total cost (ATC) below  $P_M$  and the MC curve passes through the minimum of the ATC curve. The response earned the fifth point in part (a) because the response shows the correct area of deadweight loss shaded.

Part (b): 1 point

The response earned the point in part (b) because the response states a binding price ceiling.

Part (c): 1 point

The response earned the point in part (c) because the response states the profit-maximizing quantity will decrease and explains demand decreases, causing the MR curve to shift left.

Part (d): 3 points

The response earned the first point in part (d) because the response shows a perfectly competitive labor market with a downward-sloping demand ( $D_L$ ) curve and an upward-sloping supply ( $S_L$ ) curve with the equilibrium wage and quantity of labor, labeled  $W_E$  and  $Q_E$ . The response earned the second

**Question 1 (continued)**

point in part (d)(ii) because the response shows a shift of the labor supply curve to the right, identifying the new wage and quantity of labor with  $W_2$  and  $Q_2$ . The response earned the third point in part (d) because the response calculates the wage as \$200 and shows the work.

**Sample: 1B****Score: 6**

Part (a): 5 points

The response earned the first point in part (a) because the response shows a monopoly graph with a downward-sloping demand curve (D) and a downward-sloping marginal revenue curve (MR) with the MR curve below the D curve. The response earned the second point in part (a) because the response shows a marginal cost (MC) curve and the profit-maximizing quantity  $Q_M$  where  $MR=MC$ . The response did not earn the third point in part (a) because the response shows the profit-maximizing price ( $P_M$ ) from the MR curve at  $Q_M$ . The response earned the fourth point in part (a) because the response shows average total cost (ATC) below  $P_M$ , and, the MC curve passes through the minimum of the ATC curve. The response earned the fifth point in part (a) because the response shows deadweight loss shaded.

Part (b): 1 point

The response did not earn the point in part (b) because the response states a binding price floor.

Part (c): 1 point

The response did not earn the point in part (c) because the response states the profit-maximizing quantity will stay the same.

Part (d): 3 points

The response earned the first point in part (d) because the response shows a perfectly competitive labor market with a downward-sloping demand ( $D_L$ ) curve and an upward-sloping supply ( $S_L$ ) curve with the equilibrium wage and quantity of labor, labeled  $W_E$  and  $Q_E$ . The response earned the second point in part (d)(ii) because the response shows a shift of the labor supply curve to the right, identifying the new wage and quantity of labor with  $W_2$  and  $Q_2$ . The response did not earn the third point in part (d)(iii) because the response does not calculate the wage rate as \$200.

**Sample: 1C****Score: 3**

Part (a): 5 points

The response earned the first point in part (a) because the response shows a monopoly graph with a downward-sloping demand curve (D) and a downward-sloping marginal revenue curve (MR) with the

**Question 1 (continued)**

MR curve below the D curve. The response earned the second point in part (a) because the response shows a marginal cost curve and the profit-maximizing quantity, labeled  $Q_M$ , where  $MR=MC$ . The response did not earn the third point in part (a) because the response does not show the profit-maximizing price, labeled  $P_M$ , where  $MR=MC$ . The response did not earn the fourth point in part (a) because the response does not 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. The response did not earn the fifth point in part (a) because the response does not show the correct area of the deadweight loss.

Part (b): 1 point

The response did not earn the point in part (b) because the response states a per-unit tax.

Part (c): 1 point

The response did not earn the point in part (c) because the response does not explain that demand decreases, causing the profit-maximizing quantity to decrease.

Part (d): 3 points

The response earned the first point in part (d) because the response shows a perfectly competitive labor market with a downward-sloping demand ( $D_L$ ) curve and an upward-sloping supply ( $S_L$ ) curve with the equilibrium wage and quantity of labor, labeled  $W_E$  and  $Q_E$ . The response did not earn the second point in part (d)(ii) because the response shows a shift of the labor supply curve to the left. The response did not earn the third point in part (d)(iii) because the response does not calculate the wage rate as \$200.