

Question 3: Short 5 points

A	State “No,” producing Unique jewelry is not the best choice for Tony’s Trinkets if Bitaly’s Bracelets chooses to produce Silver jewelry and explain that Tony’s Trinkets’ profit from producing Typical jewelry is \$21, which is greater than its profit when producing Unique jewelry, which is \$20.	1 point
B	State that Bitaly’s Bracelets does not have a dominant strategy and explain that when Tony’s Trinkets chooses Unique, Bitaly’s Bracelets’ profit is higher when it chooses Gold, $\$21 > \19 , and when Tony’s Trinkets chooses Typical, Bitaly’s Bracelets’ profit is higher when it chooses Silver, $\$16 > \7 .	1 point
C	Identify the TWO Nash equilibria for the game as the following:	1 point
D	State that the minimum amount is \$6.	1 point
E	Calculate the new firm’s maximum combined profit as \$39 and show your work.	1 point
	Maximum Combined Profit = $\$20 + \$19 = \$39$	

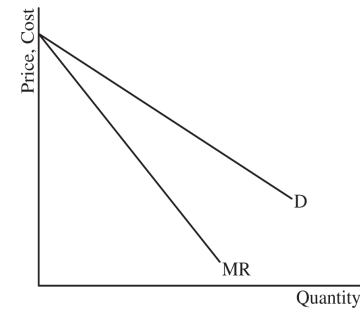
Question 3: Short 5 points

(a)	State that Field Cruiser’s most profitable strategy is to improve Power.	1 point
(b)	State no, Nice Ride does not have a dominant strategy and explain that if Field Cruiser chooses Reliability, then Nice Ride will choose Comfort since \$30 million is greater than \$10 million, and if Field Cruiser chooses Power, then Nice Ride will choose Safety since \$32 million is greater than \$25 million.	1 point
(c)	State yes, the combination of strategies is a Nash Equilibrium and explain that if Field Cruiser unilaterally chooses Reliability, its profits will decrease from \$35 million to \$28 million and if Nice Ride unilaterally chooses Comfort, its profits will decrease from \$32 million to \$25 million.	1 point
(d)	State that the new firm’s total profit will be \$70 million.	1 point
(e)	State that Nice Ride’s profit will be \$30 million and Field Cruiser’s profit will be \$40 million at the Nash equilibrium.	1 point

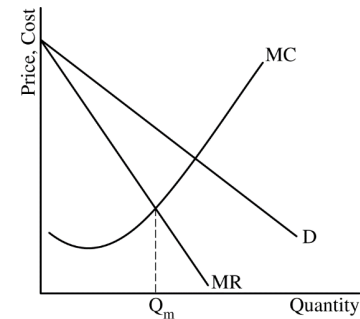
Total for question 3 5 points

Question 1: Long 10 points

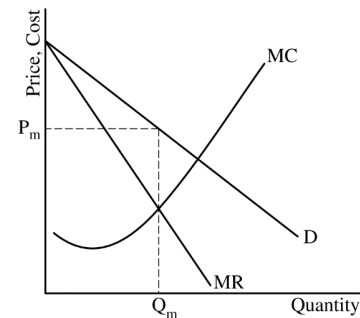
- (a) Draw a correctly labeled graph for NCHart showing downward-sloping demand (D) and marginal revenue (MR) curves with the marginal revenue curve below the demand curve. 1 point



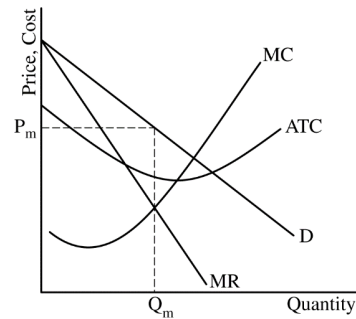
- For the second point, the graph must show the marginal cost (MC) curve and the profit-maximizing quantity, labeled Q_m , where $MR=MC$. 1 point



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

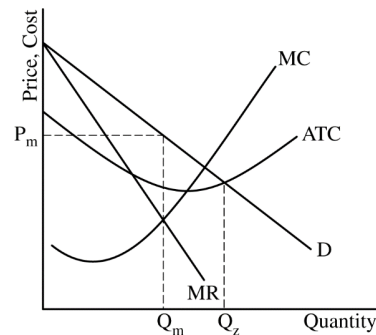


For the fourth point, the graph must show the ATC below the demand curve at Q_m with the MC curve rising and intersecting the ATC curve at its minimum.

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****2019****AP** CollegeBoard

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Scoring Guidelines

Set 1

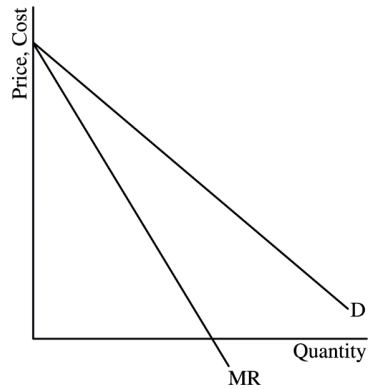
2019 SCORING GUIDELINES

Question 1

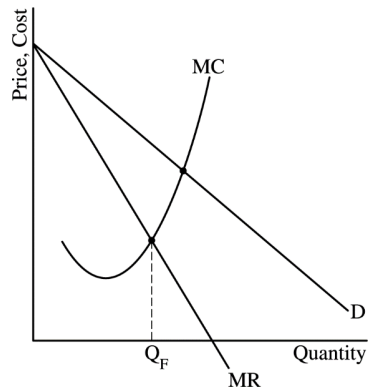
9 points (5 + 2 + 2)

(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.



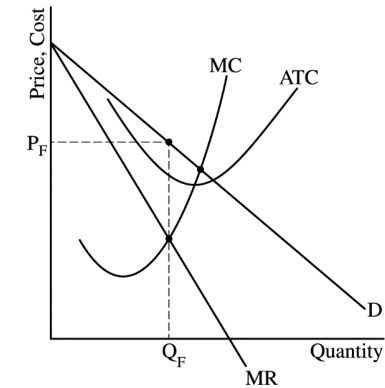
- One point is earned for showing the profit-maximizing quantity, labeled Q_F , where $MR = MC$.



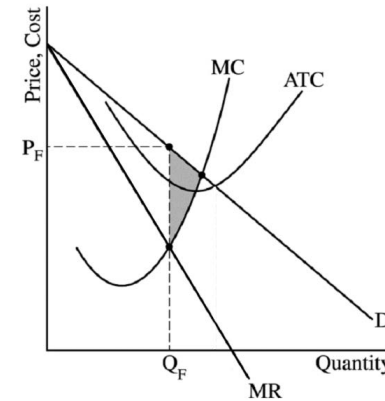
2019 SCORING GUIDELINES

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).



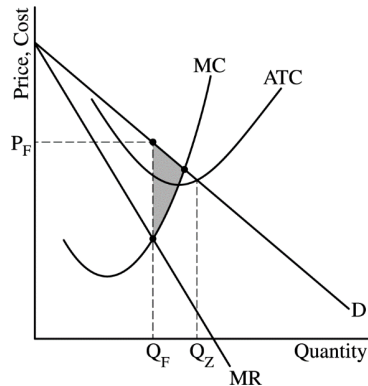
- One point is earned for completely shading the area representing the deadweight loss.



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).

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

(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."

2019

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Scoring Guidelines

Set 2

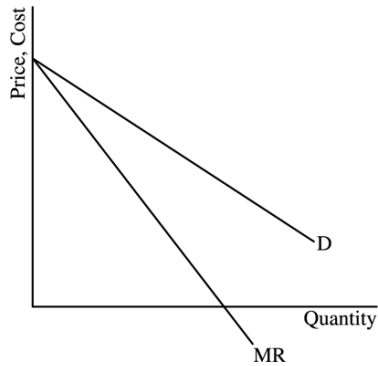
2019 SCORING GUIDELINES

Question 1

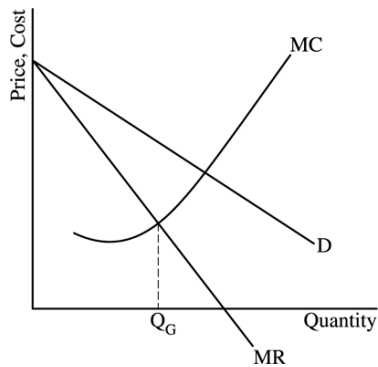
9 points (5 + 2 + 2)

(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.



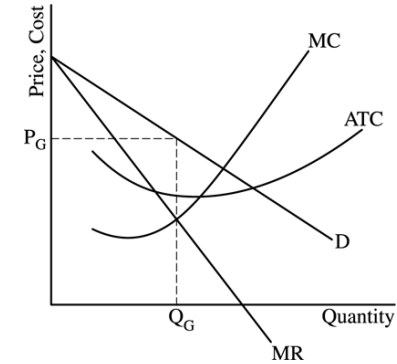
- One point is earned for showing the profit-maximizing quantity, labeled Q_G , where $MR=MC$.



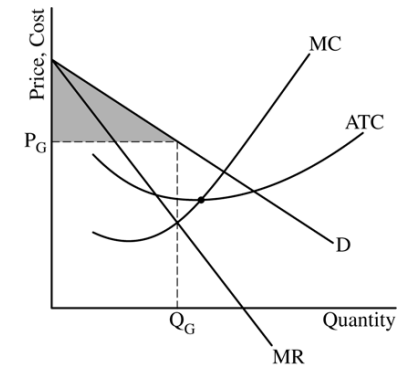
2019 SCORING GUIDELINES

Question 1 (continued)

- One point is earned for both showing the profit-maximizing price, labeled P_G , from the demand curve at Q_G , and above the average total cost (ATC) curve.
- One point is earned for showing the marginal cost (MC) curve rising and passing through the minimum point of the ATC curve.



- One point is earned for completely shading the area of the consumer surplus.



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

(b) 2 points

- One point is earned for stating that Gigantic Pharmaceutical Corporation's demand for warehouse workers will increase and for explaining that the marginal revenue product of labor increases because of the increase in the product price.
- One point is earned for stating that the wage rate Gigantic pays to its warehouse workers will not change and the number of workers hired will increase.

(c) 2 points

- One point is earned for stating that Gigantic's producer surplus will decrease.
- One point is earned for stating that the consumer surplus will increase and for explaining that because of the increased competition the price will decrease and the quantity will increase.

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

(a) 2 points

- One point is earned for identifying the after-tax price paid by consumers as P_3 and the after-tax quantity as Q_2 .
- One point is earned for identifying the area representing the total tax revenue as:
 P_1P_3SZ , or
 $(P_3 \times Q_2) - (P_1 \times Q_2)$, or
 $(P_3 - P_1) \times Q_2$

(b) 2 points

- One point is earned for stating that the price paid by consumers will be higher.
- One point is earned for stating that the tax revenue received by the government will be higher because the tax does not reduce the quantity purchased when the demand is perfectly inelastic, while the quantity does fall when demand is downward sloping (i.e., $Q_3 > Q_2$).

(c) 1 point

- One point is earned for stating that the producer surplus will stay the same, and for explaining that this is because both the price received by sellers (P_2) and the quantity sold (Q_3) do not change. It is also acceptable to explain that producer surplus stays the same because the consumer bears the full burden of the tax.

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

(a) 1 point

- One point earned for stating that Jackpot Florist's dominant strategy is to close at 6 p.m.

(b) 1 point

- One point is earned for stating that this is not the profit-maximizing action by Boulevard Gardens and for explaining that Boulevard will earn \$30 by choosing Delivery instead of \$20 choosing No Delivery.

(c) 1 point

- One point is earned for identifying the profit for Boulevard Gardens in the Nash equilibrium as \$30.

(d) 1 point

- One point is earned for stating that they would choose to close at 9 p.m. and offer No Delivery.

(e) 2 points

- One point is earned for redrawing the payoff matrix showing the effect of the agreement.

		Boulevard	
		Delivery	No Delivery
Jackpot	6 p.m.	\$35,\$30	\$43,\$32
	9 p.m.	\$37,\$38	\$45,\$40

- One point is earned for stating that Boulevard will agree to Jackpot's proposal and for explaining that Boulevard will be better off because this will increase the payoff from \$30 to \$40.

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2015 Scoring Guidelines

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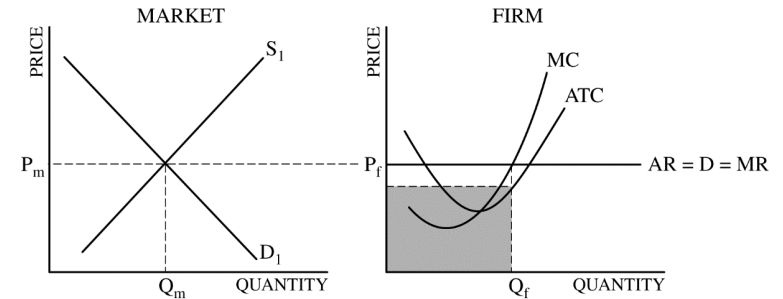
2015 SCORING GUIDELINES

Question 1

10 points (1+5+1+3)

(a) 1 point:

- One point is earned for stating that the firm's price is equal to the market price because the firm is a price taker.



(b) 5 points:

- One point is earned for drawing a correctly labeled graph of the market with P_m , Q_m , a downward-sloping demand curve, and an upward-sloping supply curve.
- One point is earned for identifying the firm's profit-maximizing quantity, Q_f at marginal cost (MC) equal to price or demand, or marginal revenue, or average revenue.
- One point is earned for showing the firm's average revenue curve, labeled AR, which is horizontal at the price determined by the market.
- One point is earned for showing the firm's average total cost (ATC) curve, such that the MC curve is passing through the minimum of the ATC curve, and $P > ATC$.
- One point is earned for showing the area representing total cost shaded completely.

(c) 1 point:

- One point is earned for stating that the firm's total revenue will fall to zero, because quantity decreases to zero, or because the firm is a price taker, or because the firm is facing a perfectly elastic demand, or the firm loses all of its customers, or the firm has no market power.

(d) 3 points:

- One point is earned for stating that the firm's quantity will remain the same in the short run and for explaining that MR or MC will not change in the short run. (Or, because the lump sum subsidy has no effect on marginal revenue and/or marginal cost, or that only fixed costs will be affected.)
- One point is earned for stating that the market price will decrease and the quantity will increase.
- One point is earned for the explanation that positive profits lead to entry of new firms that will increase the industry supply.

2015 SCORING GUIDELINES

Question 2

5 points (1+1+3)

- (a) 1 point:
- One point is earned for stating that Breadbasket has a dominant strategy of setting a low price but Quicklunch does not have a dominant strategy.
- (b) 1 point:
- One point is earned for correctly identifying the profit for Breadbasket is \$120 and the profit for Quicklunch is \$80.
- (c) 3 points:
- One point is earned for redrawing the payoff matrix with the subsidy:

		Quicklunch	
		High Price	Low Price
Breadbasket	High Price	\$105, \$110	\$40, \$150
	Low Price	\$140, \$80	\$95, \$90

- One point is earned for stating that Quicklunch will choose a low price strategy and for explaining that with the subsidy Quicklunch will earn higher profits if it charges a lower price than if it charges a higher price. (The explanation has to include \$90 > \$80 or profits increase by \$10.)
- One point is earned for stating that Breadbasket's profits will decrease from \$120 to \$95.

2015 SCORING GUIDELINES

Question 3

6 points (1+1+1+1+2)

- (a) 1 point:
- One point is earned for calculating the total producer surplus as $(1/2 \times 20 \times 20) = \200 .
- (b) 1 point:
- One point is earned for stating that imposing a price floor at \$16 is ineffective and will not create a surplus or a shortage in the market because it is set below the equilibrium price, or because it is not binding.
- (c) 1 point:
- One point is earned for stating that imposing a price ceiling at \$12 will create a shortage because quantity demanded is greater than quantity supplied, or because the price ceiling is binding.
- (d) 1 point:
- One point is earned for calculating the deadweight loss as \$150 and for showing:
 $(1/2 \times 30 \times 10)$
or
 $(1/2 \times 10 \times 10) + (1/2 \times 20 \times 10)$
or
 $\$50 + \100
- (e) 2 points:
- One point is earned for calculating the price elasticity of demand as $[(24-20)/20] / [(12-20)/20] = -0.5$, or for correctly using the midpoint formula.
 - One point is earned for stating that in this price range the demand is relatively inelastic.