Supplemental Practice Exam FRQ

1. Tronic is a typical profit-maximizing firm that produces and sells power cords in a constant-cost, perfectly competitive market that is in long-run equilibrium. The market equilibrium price of power cords is $4.

Part A

Draw correctly labeled side-by-side graphs for the power cord market and for Tronic, and show each of the following.

i. The market equilibrium price and quantity, labeled $4 and Q_M, respectively

ii. Tronic's profit-maximizing price and quantity, labeled P_F and Q_F, respectively

iii. Tronic's average total cost curve consistent with long-run equilibrium, labeled ATC

Part B

The price of Good X, a complement in consumption to power cords, has increased. On your graphs in part A, show the impact of this change in the short run on each of the following.

i. The new market equilibrium price and quantity of power cords, labeled P_2 and Q_2, respectively

ii. Tronic's new profit-maximizing price and quantity, labeled P^* and Q^*, respectively

iii. The area representing Tronic's economic profit, shaded completely

Part C

Given the increase in the price of Good X, what will happen to the market equilibrium price and quantity of power cords as the market adjusts from the short-run equilibrium in part B to the long-run equilibrium? Explain.

Part D

Tronic uses the cost-minimizing combination of capital and labor in its production process. The marginal product of labor is 75 power cords, the wage rate is $25, and the rental rate for capital is $40. Calculate the marginal product of capital. Show your work.

Part E

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Consumers can choose whether to use power cords or smart cables. A 10 percent decrease in the price of smart cables caused the quantity demanded of smart cables to increase by 12 percent and the quantity demanded of power cords to decrease by 8 percent. Calculate the cross-price elasticity of demand for power cords with respect to the price of smart cables. Show your work.

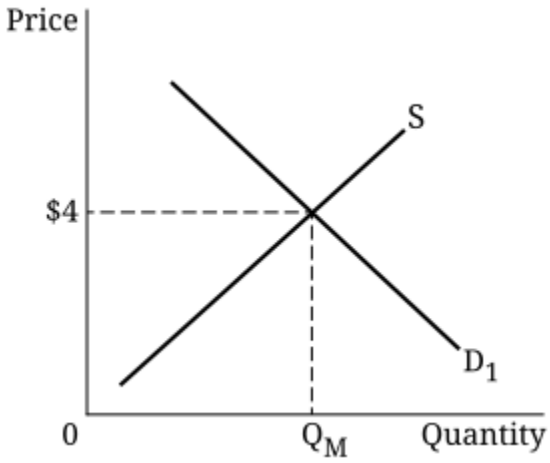
Part A Point 1
Select a point value to view scoring criteria or to score the response.

0	1

The response does not meet the criteria for this point.

Criteria:

- Draw a correctly labeled graph of the market for power cords with a downward-sloping demand (D_1) curve and an upward-sloping supply (S) curve and label the market equilibrium price as $4 and the market equilibrium quantity as Q_M.



Part A Point 2
Select a point value to view scoring criteria or to score the response.

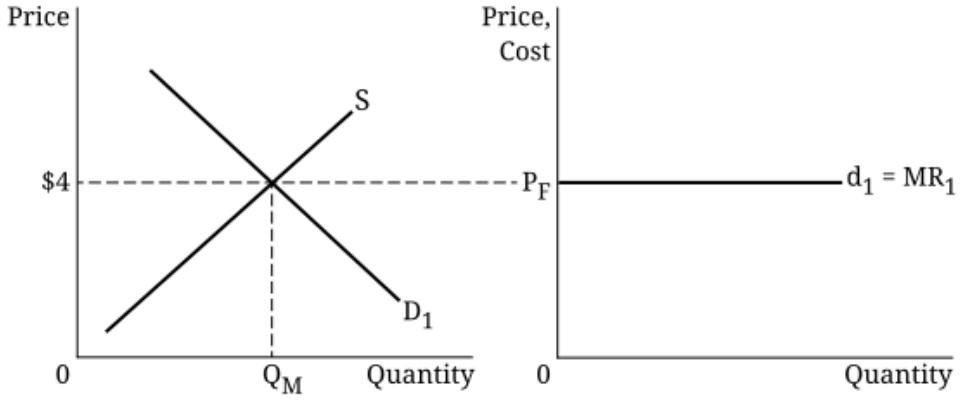
0	1

The response does not meet the criteria for this point.

Criteria:

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- Draw a correctly labeled graph of Tronic that shows the firm's horizontal demand and marginal revenue (d_1=MR_1) curve extended from the market equilibrium price ($4), and label the firm's price as P_F.



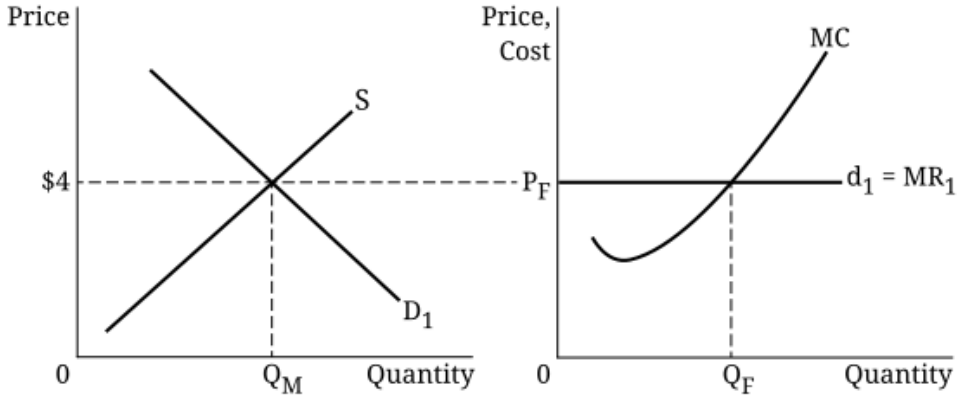
Part A Point 3
Select a point value to view scoring criteria or to score the response.

0	1

The response does not meet the criteria for this point.

Criteria:

- The firm's graph must show a rising marginal cost (MC) curve, and show the firm's profit-maximizing quantity, labeled Q_F, where MR = MC.



Part A Point 4
Select a point value to view scoring criteria or to score the response.

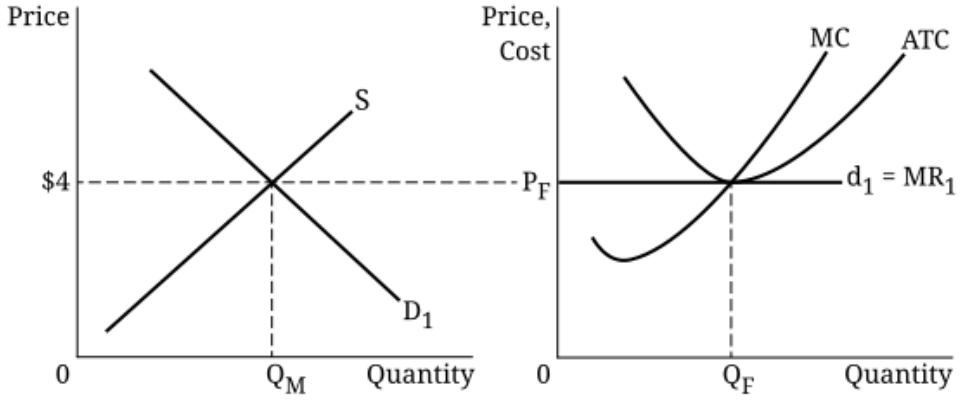
0	1

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The response does not meet the criteria for this point.

Criteria:

- The firm's graph must show the average total cost (ATC) curve tangent to the firm's d_1=MR_1 curve at Q_F, and show the MC curve passing through the minimum point of the ATC curve.



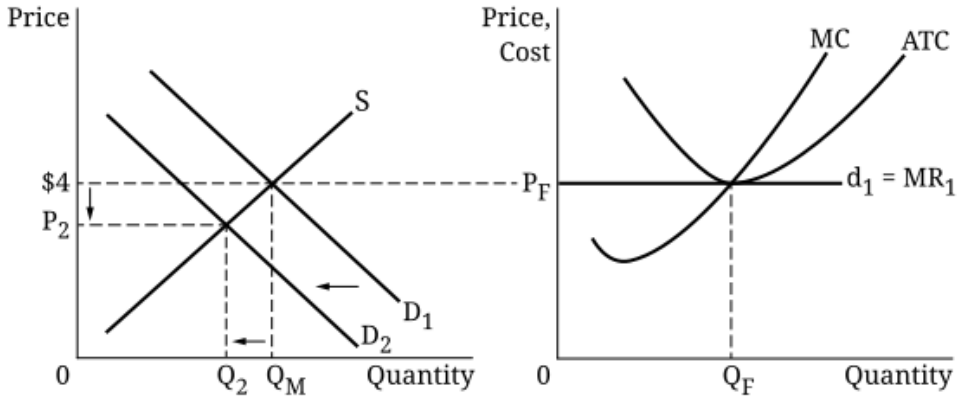
Part B (i)
Select a point value to view scoring criteria or to score the response.

0	1

The response does not meet the criteria for this point.

Criteria:

- The market graph from part A must show a leftward shift of the market demand curve, and show the new market equilibrium price of power cords, labeled P_2, and the new market equilibrium quantity of power cords, labeled Q_2.



Part B (ii)
Select a point value to view scoring criteria or to score the response.

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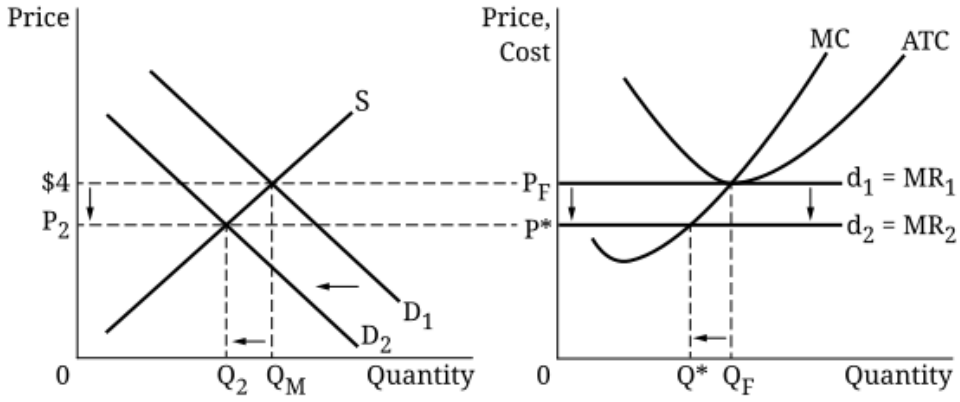
✓

0	1

The response does not meet the criteria for this point.

Criteria:

- The firm's graph from part A must show a downward shift in the firm's demand and marginal revenue (d_2=MR_2) curve that is extended from the new market equilibrium price (P_2) and show the new profit-maximizing price, labeled P*, and the new profit-maximizing quantity, labeled Q*.



Part B (iii)
Select a point value to view scoring criteria or to score the response.

✓

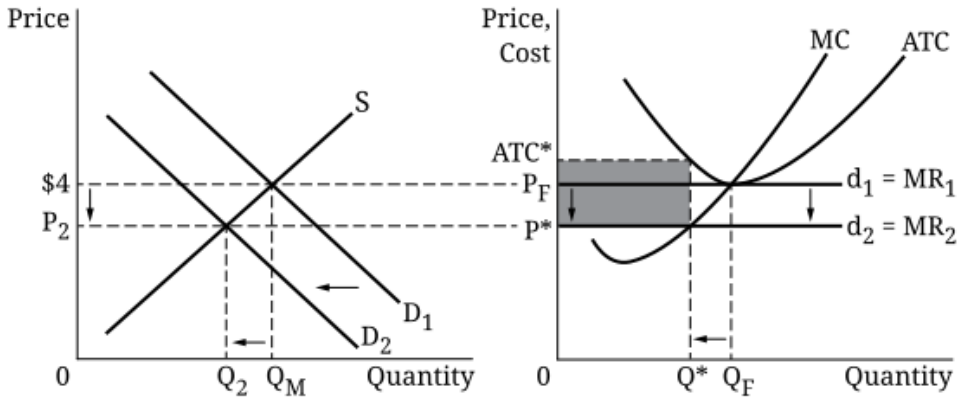
0	1

The response does not meet the criterion for this point.

Criterion:

- The firm's graph from part A must show the area representing Tronic's negative economic profit, shaded completely.

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Part C
Select a point value to view scoring criteria or to score the response.

0	1

The response does not meet the criteria for this point.

Criteria:

- State that the market equilibrium price of power cords will increase and the market equilibrium quantity of power cords will decrease and explain that negative economic profits will cause firms to exit the market, decreasing the market supply of power cords in the long run.

Part D

Select a point value to view scoring criteria or to score the response.

0	1

The response does not meet the criteria for this point.

Criteria:

- Calculate the marginal product of capital as 120 power cords and show your work.

$$\frac{\text{MP}_{\text{Labor}}}{\text{Wage Rate}} = \frac{\text{MP}_{\text{Capital}}}{\text{Rental Rate}}$$

$$\frac{75 \text{ power cords}}{\$25} = \frac{\text{MP}_{\text{Capital}}}{\$40}$$

$$\text{MP}_{\text{Capital}} = 120 \text{ power cords}$$

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Part E

Select a point value to view scoring criteria or to score the response.

0 ✓	1

The response does not meet the criteria for this point.

Criteria:

- Calculate the cross-price elasticity of demand as 0.8 and show your work.

$$\text{Cross-Price Elasticity of Demand} = \frac{\%\ \text{Change in } Q_D \text{ of Power Cords}}{\%\ \text{Change in Price of Smart Cables}} = \frac{-8\%}{-10\%} = 0.8$$

The table shows the marginal utility for Yuni when she consumes tennis rackets and shirts.

Quantity of Tennis Rackets	Marginal Utility of Tennis Rackets (utils)	Quantity of Shirts	Marginal Utility of Shirts (utils)
1	600	1	400
2	400	2	300
3	200	3	200
4	100	4	100
5	50	5	50
6	0	6	25

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2. Yuni is a utility-maximizing consumer.

Part A

If Yuni is allowed to choose either one tennis racket or two shirts for free, which of these two options will Yuni choose? Explain using numbers.

Part B

Suppose instead the price of a tennis racket is $100, the price of a shirt is $50, and Yuni's income is $500. Yuni spends all her income on tennis rackets and shirts.

i. If Yuni purchases 2 tennis rackets, what is the maximum quantity of shirts Yuni can purchase?

ii. What is the combination of tennis rackets and shirts that maximizes Yuni's total utility? Explain your answer using marginal analysis and numbers.

Part C

The market for tennis rackets is in equilibrium and generates a positive externality in consumption.

i. At the market equilibrium, is the marginal social benefit of tennis rackets greater than, less than, or equal to the marginal social cost of tennis rackets?

ii. The government grants a per-unit subsidy to producers of tennis rackets. Will the subsidy to producers increase the quantity of tennis rackets purchased by consumers? Explain.

Part A
Select a point value to view scoring criteria or to score the response.

✓ 0	1

The response does not meet the criteria for this point.

Criteria:

- State that Yuni will choose two shirts and explain that choosing two shirts will provide Yuni with 700 utils (=400 utils + 300 utils) of total utility, which is greater than the total utility of 600 utils that Yuni will receive from choosing one tennis racket.

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Part B (i)
Select a point value to view scoring criteria or to score the response.

✓	
0	1

The response does not meet the criterion for this point.

Criterion:

- State that Yuni can purchase a maximum of 6 shirts.

Part B (ii)

Select a point value to view scoring criteria or to score the response.

✓	
0	1

The response does not meet the criteria for this point.

Criteria:

- State that 3 tennis rackets and 4 shirts will maximize Yuni's total utility and explain that at this combination, the marginal utility per dollar spent on the last tennis racket is 2 utils/$

  ($= \frac{200 \text{ utils}}{\$100}$) and the marginal utility per dollar spent on the last shirt is 2 utils/$

  ($= \frac{100 \text{ utils}}{\$50}$) when Yuni spends her entire income of $500 (= $100 × 3 tennis rackets + $50 × 4 shirts).

Part C (i)
Select a point value to view scoring criteria or to score the response.

✓	
0	1

The response does not meet the criterion for this point.

Criterion:

- State that the marginal social benefit of tennis rackets is greater than the marginal social cost of tennis rackets at the market equilibrium.

Part C (ii)

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Select a point value to view scoring criteria or to score the response.

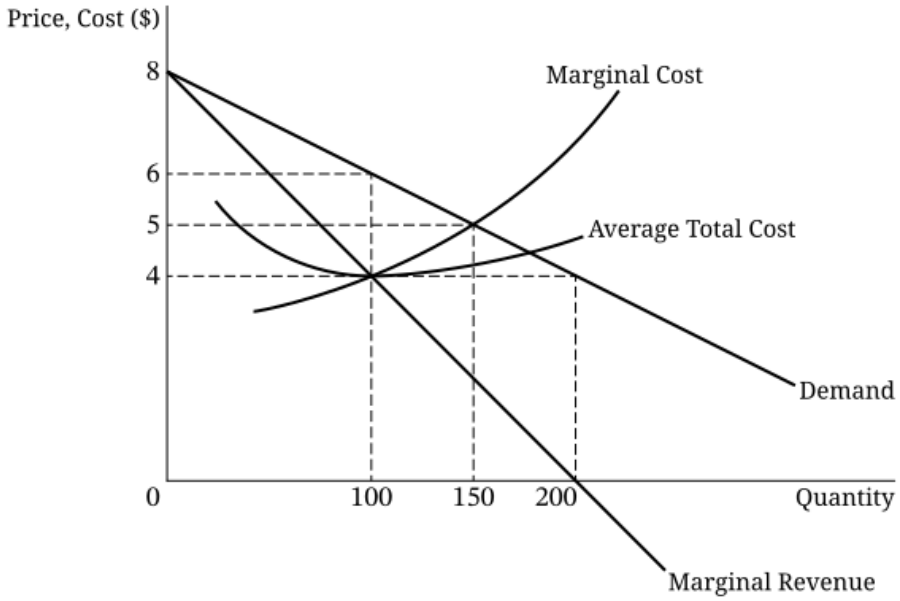
0	1

The response does not meet the criteria for this point.

Criteria:

- State that the quantity of tennis rackets purchased by consumers will increase and explain that the per-unit subsidy to producers will decrease the marginal cost of production, shifting the supply curve to the right, and lowering the market price of tennis rackets for consumers.

The graph shows the cost and revenue curves for Haye.



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3. Haye is one of many firms that produce moisturizers in a market in which each firm slightly differentiates its product and there are no barriers to entry or exit.

Part A

Identify the market structure in which Haye is operating.

Part B

Identify Haye's profit-maximizing quantity and price.

Part C

Calculate the consumer surplus at the profit-maximizing quantity and price identified in part B. Show your work.

Part D

Is the profit-maximizing quantity identified in part B allocatively efficient? Explain using numbers.

Part E

What will happen to Haye's economic profit in the long run? Explain.

Part A
Select a point value to view scoring criteria or to score the response.

0	1

The response does not meet the criterion for this point.

Criterion:

- State that Haye operates in a monopolistically competitive market.

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Part B
Select a point value to view scoring criteria or to score the response.

✓

0	1

The response does not meet the criteria for this point.

Criteria:

- Identify Haye's profit-maximizing quantity as 100 units and price as $6.

Part C

Select a point value to view scoring criteria or to score the response.

✓

0	1

The response does not meet the criteria for this point.

Criteria:

- Calculate the consumer surplus as $100 and show your work

$$\text{Consumer Surplus} = \frac{1}{2} \times (\$8 - \$6) \times (100 - 0) = \frac{1}{2} \times \$2 \times 100 = \$100$$

Part D
Select a point value to view scoring criteria or to score the response.

✓

0	1

The response does not meet the criteria for this point.

Criteria:

- State no, the profit-maximizing quantity is not allocatively efficient and explain with ONE of the following:
  - The profit-maximizing quantity is 100, which is less than the allocatively efficient quantity of 150, resulting in deadweight loss.
  - The marginal benefit (price) of $6 is greater than the marginal cost of $4, resulting in deadweight loss.

Part E
Select a point value to view scoring criteria or to score the response.

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0	1

The response does not meet the criteria for this point.

Criteria:

- State that Haye's economic profit in the long run will decrease to zero and explain that positive economic profit in the short run will encourage new firms to enter the market, producing substitutes and competing alternatives to Haye's product, which decreases the demand for Haye's product.