

## EE211 Section 1 Homework 4 Answers

1. Draw the cost curves for a typical firm. Explain how a competitive firm chooses the level of output that maximizes profit. At that level of output, show on your graph the firm's total revenue and total cost. (Check your answers on Chapter 15 eBook)
2. Under what conditions will a firm shut down temporarily? Explain? (Check your answers on Chapter 15 eBook)
3. Under what conditions will a firm exit a market? Explain? (Check your answers on Chapter 15 eBook)
4. Short-Run Equilibrium in the Competitive Market. Three possible positions for a firm when the industry is in short run equilibrium. Illustrate the graphs in each scenario for market and firm (positive, zero, and negative profits) with full explanation on each scenario. (Check your answers on Chapter 15 eBook)
5. Illustrate the graphs with full explanation for market and firm with adjustments in the long-run equilibrium in the competitive market for question 4. (Check your answers on Chapter 15 eBook)

## Chapter 15

### Problems and Applications # 1, 4, 5, and 8

1.

- a. As shown in Figure A, the typical firm's initial marginal-cost curve is  $MC_1$  and its average-total-cost curve is  $ATC_1$ . In the initial equilibrium, the market supply curve,  $S_1$ , intersects the demand curve at price  $P_1$ , which is equal to the minimum average total cost of the typical firm. Thus, the typical firm earns no economic profit. The rise in the price of crude oil increases production costs for individual firms (from  $MC_1$  to  $MC_2$  and from  $ATC_1$  to  $ATC_2$ ) and thus shifts the market supply curve to the left, to  $S_2$ .

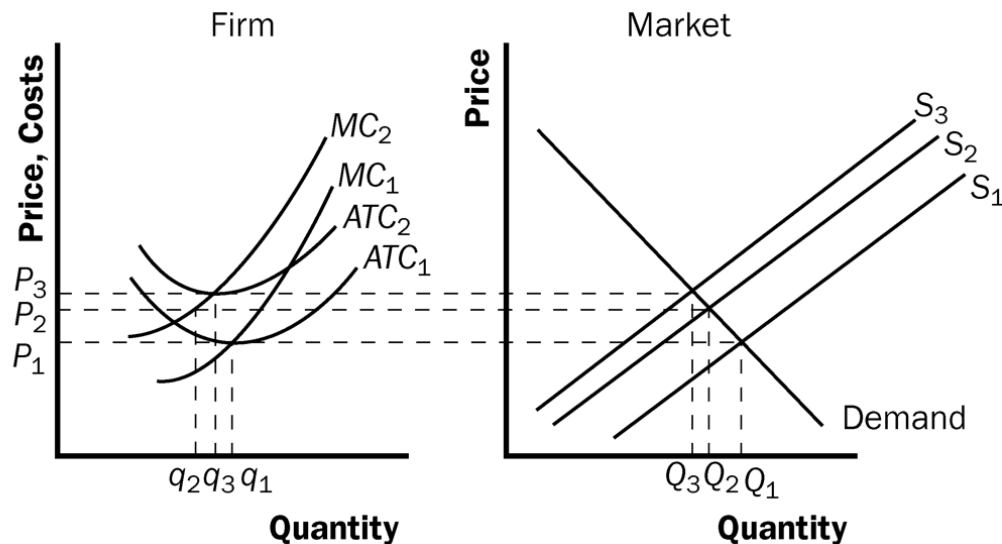


Figure A

- b. When the market supply curve shifts left to  $S_2$ , the equilibrium price rises from  $P_1$  to  $P_2$ , but the price does not increase by as much as the increase in marginal cost for the firm. As a result, price is less than average total cost for the firm, so profits are negative.

In the long run, the negative profits lead some firms to exit the market. As they do so, the market supply curve shifts to the left. This continues until the price rises to equal the minimum point on the firm's average-total-cost curve. The long-run equilibrium occurs with supply curve  $S_3$ , equilibrium price  $P_3$ , total market output  $Q_3$ , and firm's output  $q_3$ . Thus, in the long run, profits are zero again and there are fewer firms in the market.

4.

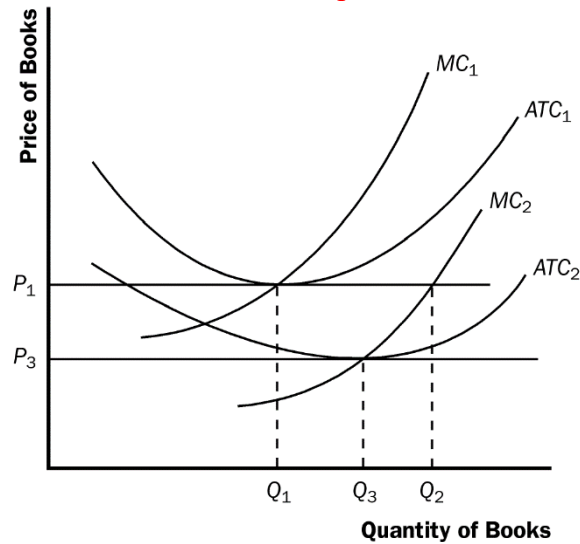
a. Costs are shown in the following table:

<i>Q</i>	<i>TFC</i>	<i>TVC</i>	<i>AFC</i>	<i>AVC</i>	<i>ATC</i>	<i>MC</i>
0	\$100	\$0	----	----	----	----
1	100	50	\$100	\$50	150	50
2	100	70	50	35	85	20
3	100	90	33.3	30	63.3	20
4	100	140	25	35	60	50
5	100	200	20	40	60	60
6	100	360	16.7	60	76.7	160

- b. If the price is \$50, the firm will minimize its loss by producing 4 units, where price is equal to marginal cost. When the firm produces 4 units, its total revenue is \$200 ( $\$50 \times 4 = \$200$ ) and its total cost is \$240 ( $\$100 + \$140$ ). This would give the firm a loss of \$40. If the firm shuts down, it will earn a loss equal to its fixed cost (\$100). Shutting down was not a wise decision.
- c. If the firm produces 1 unit, its total revenue is \$50 and its total cost is \$150 ( $\$100 + \$50$ ), so its loss will still be \$100. This was also not the best decision. The firm could have reduced its loss by producing more units because the marginal costs of the second and third unit are lower than the price.

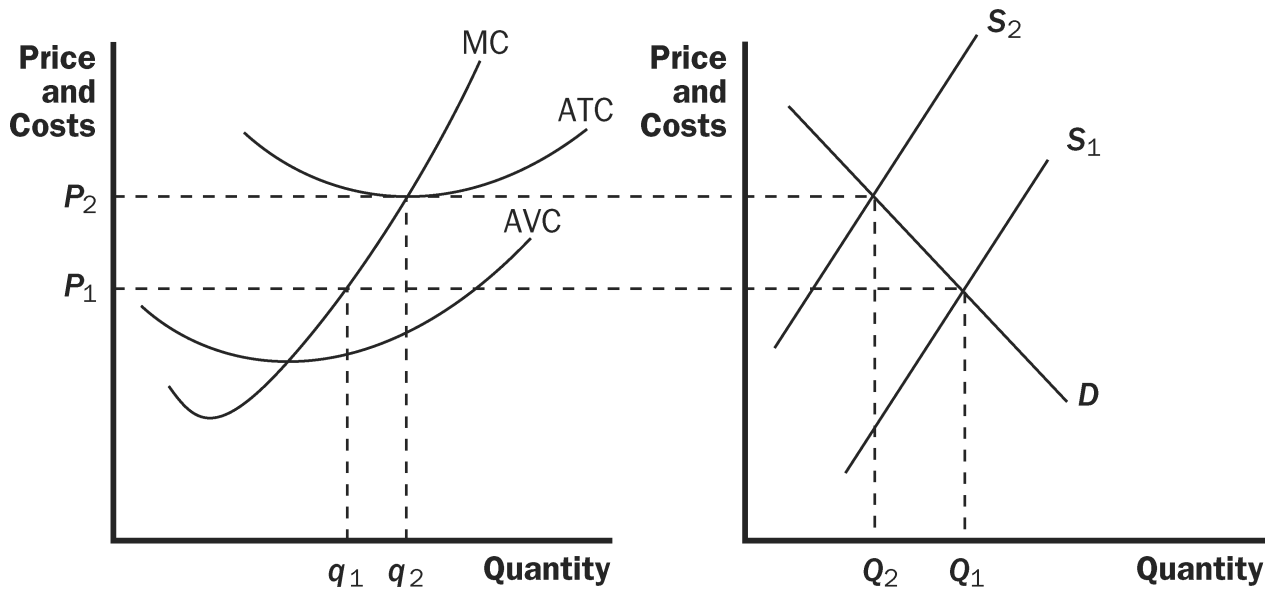
5.

- a. Figure B shows the curves of a typical firm in the industry, with average total cost  $ATC_1$ , marginal cost  $MC_1$ , and marginal revenue equal to price  $P_1$ . The long-run-supply curve is the marginal cost curve above the minimum point of  $ATC_1$ .
- b. The new process reduces Hi-Tech's marginal cost to  $MC_2$  and its average total cost to  $ATC_2$ , but the price remains at  $P_1$  because other firms cannot use the new process. Thus Hi-Tech produces  $Q_2$  units and earns positive profits.
- c. When the patent expires and other firms are free to use the technology, all firms' average-total-cost curves decline to  $ATC_2$ , so the market price falls to  $P_3$  and firms earn zero profit.



**Figure B**

- 8.
- If firms are currently incurring losses, price must be less than average total cost. However, because firms in the industry are currently producing output, price must be greater than average variable cost. If firms are maximizing profits, price must be equal to marginal cost.
  - The present situation is depicted in Figure C. The firm is currently producing  $q_1$  units of output at a price of  $P_1$ .



**Figure C**

- Figure also shows how the market will adjust in the long run. Because firms are incurring losses, there will be exit in this industry. This means that the market supply curve will shift to the left, increasing the price of the product. As the price rises, the remaining firms will increase quantity supplied; marginal cost will increase. Exit will continue until price is equal to minimum average total cost. Average total cost will be lower in the long run than in the short run. The total quantity supplied in the market will fall.