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. **(Lecture note)**
2. Under what conditions will a firm **shut down temporarily**? Explain? **(Lecture note)**
3. Under what conditions will a firm **exit a market**? Explain? **(Lecture note)**
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. **(Lecture note)**
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. **(Lecture note)**

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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.

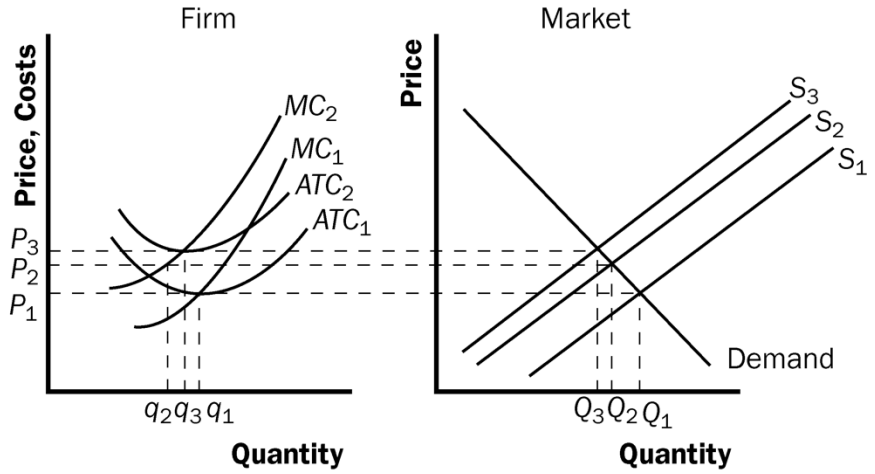

Figure A

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:

Q	*TFC*	*TVC*	*AFC*	*AVC*	*ATC*	*MC*
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 x 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 ATC1, marginal cost MC1, and marginal revenue equal to price P1. The long-run-supply curve is the marginal cost curve above the minimum point of ATC1.
b. The new process reduces Hi-Tech's marginal cost to MC2 and its average total cost to ATC2, but the price remains at P1 because other firms cannot use the new process. Thus Hi-Tech produces Q2 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 ATC2, so the market price falls to P3 and firms earn zero profit.

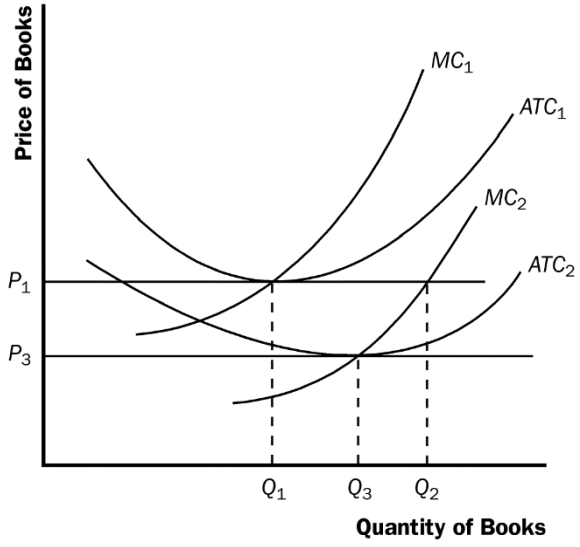

Figure B

8.

a. 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.

b. The present situation is depicted in Figure C. The firm is currently producing q1 units of output at a price of P1.

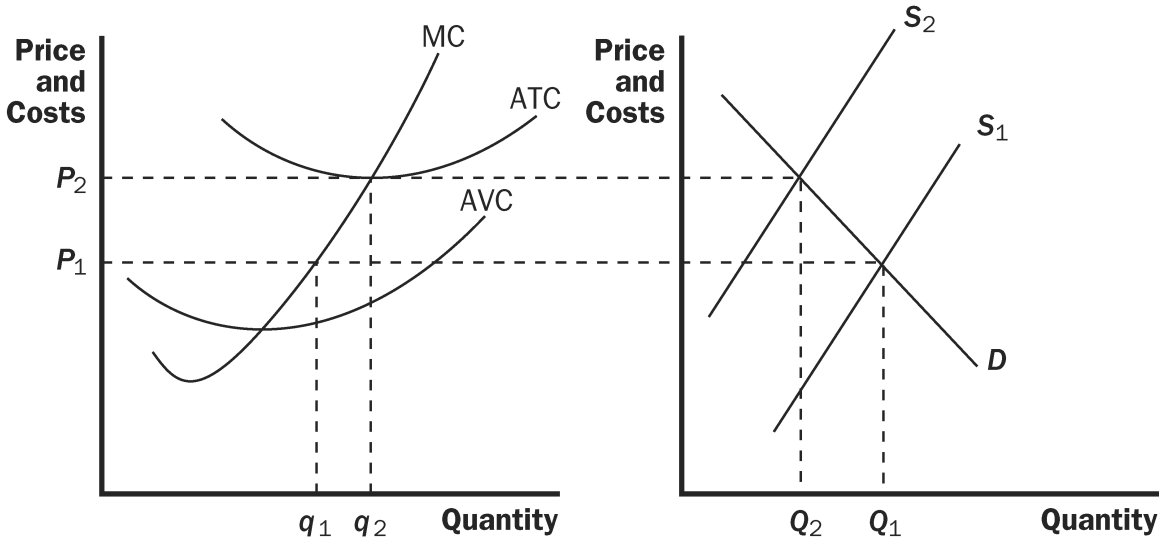

Figure C

c. Figure C 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.