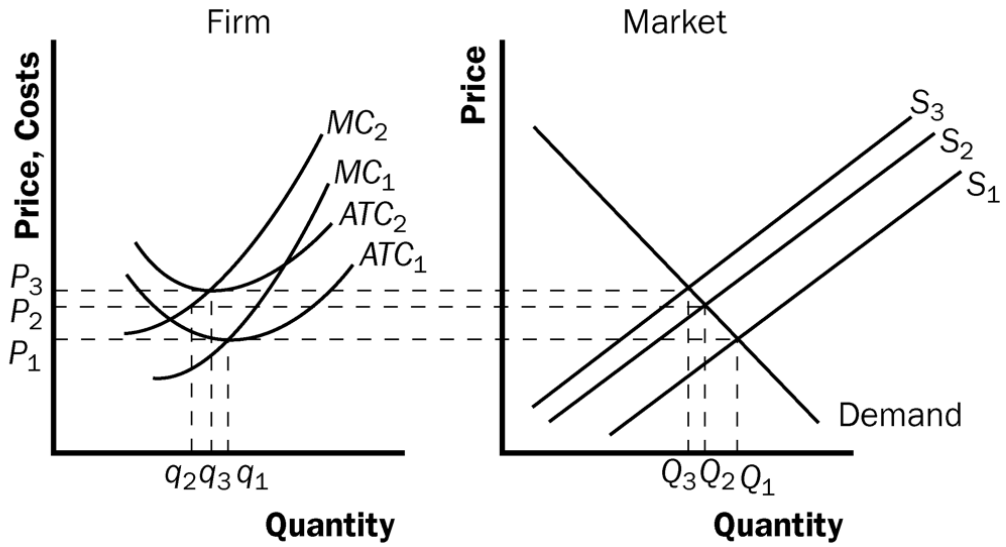
EE211 Section 1
Homework 4 Answers
Explain your answers with graph in details.

Mankiw, N.G., (2023) Principles of Microeconomics, 10th ed., Cengage, (ISBN-13: 978-981-5119-30-5)

Chapter 15
Problems and Applications # 1, 3, 4, 7, 8 and 9

1.

a. As shown in Figure, 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.



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.

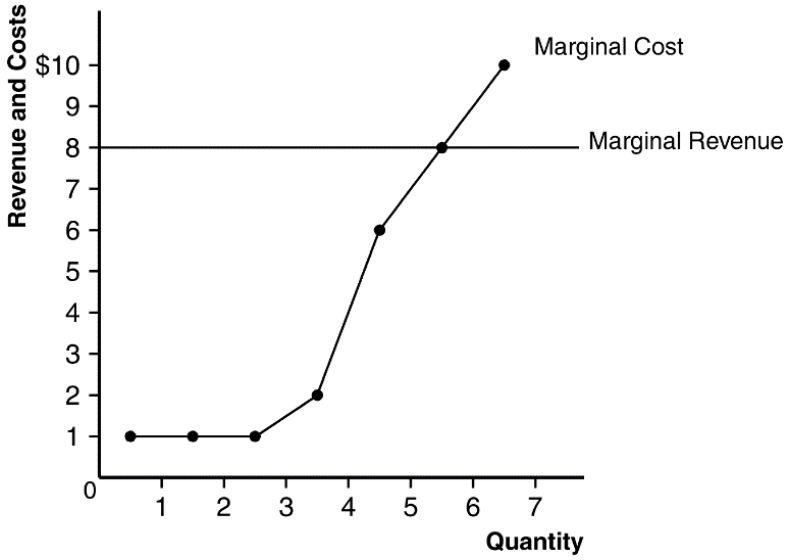
In the long run, the negative profits lead some firms to exit the market. As they do so, the market supply curve shifts to the left. This continues until the price rises to equal the minimum point on the firm's average-total-cost curve. The long-run equilibrium occurs with supply curve S_3, equilibrium 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.

3. **Here is the table showing costs, revenues, and profits:**

Quantity	Total Cost	Marginal Cost	Total Revenue	Marginal Revenue	Profit
0	$8	---	$0	---	$-8
1	9	$1	8	$8	-1
2	10	1	16	8	6
3	11	1	24	8	13
4	13	2	32	8	19
5	**19**	**6**	**40**	**8**	**21**
6	**27**	**8**	**48**	**8**	**21**
7	37	10	56	8	19

a. The firm should produce **five or six units to maximize profit**.

b. Marginal revenue and marginal cost are graphed in Figure. The curves cross at a quantity between five and six units, yielding the same answer as in Part (a).



c. This industry is competitive because marginal revenue is the same for each quantity. The industry is not in long-run equilibrium, because profit is not equal to zero.

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.

7.

a. Profit is equal to (P – ATC) × Q. Price is equal to AR. Therefore, profit is ($10 – $8) × 100 = $200.

b. For firms in perfect competition, marginal revenue and average revenue are equal. Since profit maximization also implies that marginal revenue is equal to marginal cost, marginal cost must be $10.

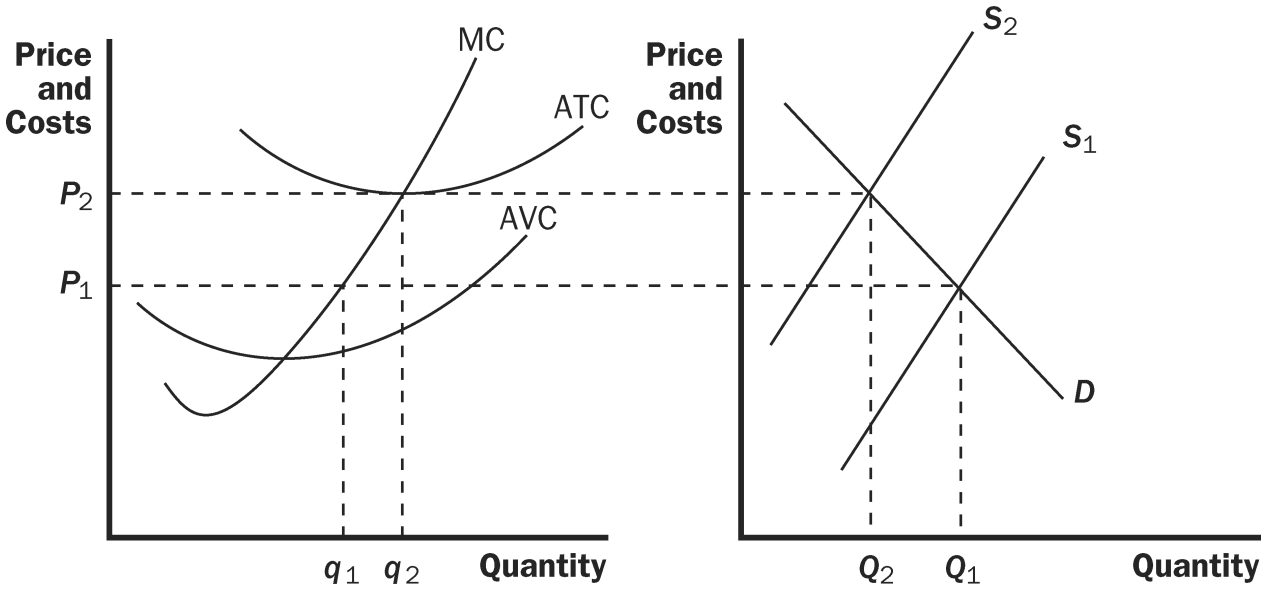
c. Average fixed cost is equal to AFC /Q which is $200/100 = $2. Since average variable cost is equal to average total cost minus average fixed cost, AVC = $8 − $2 = $6.

d. Since average total cost is less than marginal cost, average total cost must be rising. Therefore, the efficient scale must occur at an output level less than 100.

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. The firm is currently producing q1 units of output at a price of P1.



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.

9.

a. The table below shows *TC* and *ATC* for a typical firm:

Q	***TC***	***ATC***
1	11	11
2	15	7.5
3	21	7
4	29	7.25
5	39	7.8
6	51	8.5

b. At a price of $11, quantity demanded is 200. With marginal revenue of $11, each firm will choose to produce 5 pies where their marginal cost is closest to the marginal revenue without exceeding marginal revenue. Therefore, there will be 40 firms (= 200/5). Each producer will earn total revenue of $55 ($11 x 5), total cost is $39, so profit is $16.

c. The market is not in long-run equilibrium because firms are earning positive economic profit. Firms will want to enter the market.

d. With free entry and exit, each producer will earn zero profit in the long run. Long-run equilibrium will occur when price is equal to minimum average total cost ($7). At that price, 600 pies are demanded. Each firm will only produce 3 pies (the quantity at which, MC is closest to MR without exceeding MR) meaning that there will be 200 pie producers in the market.