Answers to Selected Questions
Review Questions Based on Chapters 9 and 10

1. **If each firm is in long-run equilibrium, need the industry also be in long-run equilibrium? (b). If the firm and the industry are in long-run equilibrium, need they also be in short-run equilibrium? (c). Discuss the efficiency implications of a perfectly competitive industry when in long-run equilibrium.**

Ans:
a. If the industry is in long-run equilibrium, then each firm in the industry must also be in long-run equilibrium. However, the reverse is not true.
b. If the firm and the industry are in long-run equilibrium, they must also be in short-run equilibrium. However, the reverse is not true.
c. $P = MC \Rightarrow$ optimal allocation of resources to the industry. Zero profit implies consumers get the product at the lowest possible price.

2. **Must all firms in a perfectly competitive industry have the same cost curves so that when the industry is in long-run equilibrium, they will all break even? Explain.**

Ans: Most people will answer in the affirmative. All firms just break even under perfect competition.

3. **Distinguish between (a) decreasing returns to scale and increasing cost industries (b) increasing returns to scale and decreasing cost industries and (c) constant returns to scale and constant-cost industries.**
Ans:
a. Decreasing Returns to Scale: An increase in the firm's LAC as its output expands and the firm builds larger scales of plant. An increasing cost industry: an industry where expansion causes an increase in factor prices.
b. The exact opposite of (a) above.

4. A handicraft sector of a mature economy is composed of many identical small firms which are producing high quality lamp shades. The equation for each firm's long-run average cost is Q + 225/Q and the long-run marginal cost of each firm is 2Q, where Q is the number of shades produced.
(a). Find the profit maximizing level of output and price for each firm under conditions of long-run equilibrium.
(b). If the market demand function at this optimum level of output is Q = 6000 - 50P, calculate the market output of lamp shades and the number of firms in the industry.
(c). If there is a short-run increase in the market demand for lamp shades so that the new demand function is Q = 7000 - 50P, find the new short-run price level and the short-run total abnormal profits for each firm. What type of industry is it?

Ans:
a. Under perfect competition, the equilibrium condition would be

$$P = LAC = LMC$$

Equate LAC and LMC, $Q = \dfrac{225}{Q} = 2Q, \Rightarrow Q = 15.$

$\Rightarrow LMC = 2Q = 30$. Equate this to *P, P* = \$30.

b. Market demand: Q = 6000 - 50*P*. Subst. For *P*, Q = 6000 - 50(30) = 4500.
c. Market demand rises: Q = 7000 - 50*P*. In the short run, Q is still 4500. Solving for *P, P* = \$50. Short run total profits: (50 - 30) x 15 = \$300.

5. Discuss the key differences between perfect competition and pure monopoly if the monopolist does not affect factor prices.

6. Compare the long-run equilibrium point of a pure monopolist with that of perfectly competitive firm and industry. Should the government break up a large monopoly into a large number of perfectly competitive firms?

Ans:
a. Because of barriers to entry, the pure monopolist can make profits in the long run while a perfectly competitive firm always break even. Also, a monopolist does not always operate at the minimum of the LAC. Finally, while each perfectly competitive firm produces where P = MC and so there is an optimal allocation of resources, the pure monopolist produces where P > MC and so there is misallocation of resources in the economy.
b. For constant-cost and constant-returns-to-scale industries, yes. A government break-up would result in lower prices and lower LAC. For natural monopolies, no. Reason: cost and technological considerations.

7. **Are cases of pure monopoly in Canada today? What factors limit the pure monopolist's market power? Will a monopoly ever produce a pareto-efficient level of output on its own?**

Ans:
a. Pure monopolies are almost non-existent. We have *regulated* monopolies.
b. Consumer sovereignty, Government regulation and threat of competition.

8. Contrast pure monopoly with regulated monopoly. What are some of the regulatory measures of monopoly power? What are the trade-offs associated with these measures? Why is the average cost pricing rule not an efficient regulatory mechanism?
9. Write short notes on the following: *The Burden of Monopoly, The Appropriability Problem, Mark-up Pricing Rule, The Lerner Index of Monopoly Power, Optimal Patent Policy, Market Segmentation.*
10. Given the demand function Q = 12 - P, (a) find the D and MR schedules. (b) Plot the D and MR schedules and (c) find the MR when P = \$10, \$6 and \$2.

11. **Will the monopolist continue to produce in the short-run if he incurs a loss at his best short-run level of output? What happens in the long-run?**
Ans:
a. If, at the best level of output, AVC < P < AC, then the firm must continue to produce in the short run in order to minimize short run total cost. If P < AVC, the firm must shut down.
b. In the long run, the firm could build the most appropriate plant size to produce the best optimal output.

12**. The demand function faced by a monopolist is Q = 17 - P. The monopolist operates two plants with different SMCs at various levels of output given in the Table below:**

Q	1	2	3	4	5
SMC$_1$	3	4	7	11	15
SMC$_2$	5	7	9	13	17

(a). Determine (numerically and geometrically) the profit-maximizing level of output.

(b). How much of this output should be produced in each plant, and why?

Ans:

Hint: Get $\sum SMC$ by horizontal summation of SMC_1 and SMC_2. The monopolist should produce the first and second units in plant 1 (at SMC of \$3 and \$4, respectively), the third unit in plant 2 (at SMC of \$5) and the fourth and fifth units in plants 1 and 2, respectively. The best level of output for this monopolist is five units.

13. Using appropriate diagrams, show (a) a monopolist operating the optimum scale of plant at its optimum rate of output when in long-run equilibrium, (b) a monopolist overutilizing a larger than the optimum scale of plant when in long run equilibrium.
(c). Discuss the condition which determines whether a monopolist will operate the optimum scale of plant, a larger than the optimum scale of plant, or a smaller than the optimum scale of plant, when in long-run equilibrium.

14. **Two demand functions facing a monopolist are $Q_1 = 12 - P$ and $Q_2 = 8 - P/3$. The monopolist incurs a SMC of \$1 to increase output from one to two units, a SMC of \$3 to increase output from two to three units, a SMC of \$9 to increase output from three to four units and a SMC of \$18 to increase output from four to five units.**
(a). **At what price will the monopolist supply the best level of output when Q_1 is his demand curve? If Q_2 is his demand curve?**
(b). **Check your results by using the formula MR = P(1 - 1/e).**
(c). **What can you say about the monopolist's short-run supply curve?**

Ans:
a.   The monopolist will supply his short-run best level of output of 3 units at $P_2 = \$15$ when Q_2 is his demand curve, and at $P_1 = \$9$ when Q_1 is his demand curve.
b.   At P_1, $\varepsilon_1 = 3$, and at P_2, $\varepsilon_2 = 5/3$. Therefore,

$$MR_1 = P_1\left(1 - \frac{1}{e_1}\right) => \$6 = P_1\left(1 - \frac{1}{3}\right) => P_1 = \$9.$$

$$MR_2 = P_2\left(1 - \frac{1}{e_2}\right) => \$6 = P_2\left(1 - \frac{1}{5/3}\right) => P_2 = \$15.$$

c. The short run supply curve of the monopolist is undefined.

15. What conditions must exist for price discrimination to be possible? Profitable?

16. **A monopolist, selling in two separate markets, faces the following demand functions: $Q_1 = 24 - 2P$ and $Q_2 = 16 - P$. The monopolist operates a single plant with LTC as in the Table below**

Q	10	11	12	13	14	15
LTC(\$)	82.5	88	94.50	104	119	142.5

(a). **Find the LMC and the LAC schedules for this monopolist.**
(b). **Find the best level of output for the monopolist: how much of this output should be sold in each market? At what price should the output be sold in each market? How much profit will he make in each market? Compute the Lerner Index of Monopoly power in each market.**

Ans: Horizontally sum up the marginal revenues to get $\sum MR$. Equate to LMC.

$LMC = \sum MR = MR_1 = MR_2 = \$6$. Sell 6 units in market 1 and 5 units in market 2. The monopolist should charge \$9 in market 1 and \$11 in market 2. At these points, $e_1 = 3$, and $e_2 = 11/5$.

Lerner index : Market 1 = 1/3, and in Market 2, = 1/(11/5).

The LAC to produce 11 units of output (5 + 6) is \$8. The monopolist makes a profit of \$1 per unit and \$6 in total in market 1, and a profit of \$3 per unit and \$15 in total in market 2.

17. If a monopolist faced a D function given by Q = 12- P,
(a). what would be the monopolist's TR if he sold six units of the commodity?
(b). What would be the monopolist's TR if he practiced first-degree price discrimination? How much of the consumer's surplus is the monopolist extracting?
(c). If the monopolist sold the first three units at a price of \$9 per unit and the next three units at a price of \$6 per unit, how much of the consumer's surplus would he extract?

Ans:
a.   If he sold 6 units (that is, if MC = 0), TR = \$36.
b.   First-degree price discrimination: Profit = \$54. The monopolist extracts entire consumer's surplus of \$18.
c.   TR = \$45. The monopolist extracts half the consumer's surplus.

18. Give two real-world examples each of *second-degree* and *third-degree* price discrimination.

19. If Q = 100/P and $C(Q) = Q^2$, what is the optimal level of output of the monopolist? What if demand is $Q = 10P^{-3}$ and the cost function C(Q) = 2Q?

20(a). Show (algebraically) that a monopolist will always set price above marginal cost.

(b). Examine the effects of (i) a *lump sum tax* and (b) an *excise tax* on the optimal price and output of a pure monopolist.