Chapter 11: Answers to Questions and Problems

1.

a. Since $E = E_F = E_M$, $P = \left(\frac{E}{1+E}\right)MC = \left(\frac{-1.5}{1-1.5}\right)\$75 = (3)\$75 = \$225$.

b. $P = \left(\frac{E_F}{1+E_F}\right)MC = \left(\frac{NE_M}{1+NE_M}\right)\$75 = \left(\frac{2(-1.5)}{1+2(-1.5)}\right)\$75 = (1.5)\$75 = \$112.50$.

c. $P = \left(\frac{E_F}{1+E_F}\right)MC = \left(\frac{NE_M}{1+NE_M}\right)\$75 = \left(\frac{20(-1.5)}{1+20(-1.5)}\right)\$75 = \left(\frac{30}{29}\right)\$75 = \$77.59$.

2.

a. *P = $60, Q = 4,* and profits = 4($60 – $20) = $160.
b. Charge the maximum price on the demand curve starting at $100 down to $20 for each infinitesimal unit up to Q = 8 units. Profits are 8($100 – $20)(.5) = $320.
c. Charge a fixed fee of $320 and a per-unit charge of $20 per unit to earn total profits of $320.
d. Create a package of 8 units and sell the package for $480. Total profits are $320.

3.

a. Second-degree price discrimination.
b. $8 + 2($4) = $16.
c. Total profits under perfect price discrimination are 5($18 – 8)(.5) = $25, so this strategy would lead to an extra $9.

4.

a. $P_1 = \left(\frac{E_1}{1+E_1}\right)MC = \left(\frac{-2}{1-2}\right)\$10 = (2)\$10 = \$20.00$ and

$P_2 = \left(\frac{E_2}{1+E_2}\right)MC = \left(\frac{-6}{1-6}\right)\$10 = \left(\frac{6}{5}\right)\$10 = \$12.00$.

b. Here, there are two different groups with different (and identifiable) elasticities of demand. In addition, we must be able to prevent resale between the groups.

5.

a. Charge a fixed fee of $160, plus a per-unit charge of $20 per unit.
b. The optimal per-unit price is determined where *MR = MC,* or 100 - 40Q = 20. Solving yields Q = 2 units and P = $60. The profits at this output and price are $120 - $40 = $80. Thus, you earn $80 more by two-part pricing.

6.

a. The inverse demand function is $P = 200 - 4Q$. Marginal cost is \$120. The optimal number of units in a package is that output where price equals marginal cost. Thus we set $200 - 4Q = 120$ and solve to get the optimal number of units in a package, Q = 20 units.
b. The total value to a consumer of the 20 units, which is \$3,200 (computed as (.5)(20)(\$200 - \$120) + (\$120)(20) = \$3,200).

7.

a. \$225,000 (since all consumers purchase each product, you earn \$75,000 on sales of good X and \$150,000 on sales of good Y).
b. \$200,000 (since only the highest valuation type purchases each product, you earn \$60,000 on sales of good X and \$140,000 on sales of good Y).
c. Since all consumers receive at least \$110 in value from the bundle, all types buy the bundle. Profits are thus \$330,000.
d. Type 2 consumers will purchase the bundle. Type 1 consumers will purchase good X only, and type 3 consumers will purchase product Y only. Total profits are thus \$175,000 + \$60,000 + \$140,000 = \$375,000.

8. No. This would provide managers an incentive to maximize divisional profits, which would lead to double marginalization.

9. $P = \left(\frac{E}{1+E}\right)MC = \left(\frac{-4.5}{1-4.5}\right)\$11,000 = \$14,143$. Note that the markup formula for homogeneous product Cournot oligopoly is not relevant since we're given the elasticity of demand for Saturn automobiles instead of the market demand and our product is different than our two rivals.

10. With a simple ***per-unit pricing*** strategy, the optimal per-unit price is determined by MR = MC. Here, the inverse demand function is $P = 1,000 - 10Q$, so $MR = 1,000 - 20Q$. Also, MC = \$500 and fixed costs are \$10,000. Equating MR and MC yields $1,000 - 20Q = \$500$. Solving, $Q = 25$ and P = 1,000 – 10(25) = \$750. Profits at this price are (\$750 - \$500)(25) – \$10,000 = -\$3,750. Under the ***second-degree price discrimination*** strategy, 10 units (computed as 100 – 0.1(\$900) = 10) are purchased at \$900 and an additional 20 units are purchased at a price of \$700 (total quantity demanded at a price of \$700 is 30 units, but 10 of these will be sold at \$900). Profits from the second-degree price discrimination scheme are thus (\$900 – \$500)(10) + (\$700 – \$500)(20) – \$10,000 = -\$2,000. A profitable and feasible recommendation would be ***two-part pricing***. Under this proposal, the client would pay a fixed "license fee" plus a per-unit fee for each unit of the software installed and maintained. The optimal two-part price sets the per-unit fee at \$500 per unit (marginal cost). At this price, the client will purchase 50 units of the software. The optimal fixed fee is \$12,500 (computed as (.5)(\$1000 - \$500)(50) = \$12,500). Profits under two-part pricing are \$12,500 - \$10,000 = \$2,500.

11. Charge \$500 for a bundle containing skis and bindings. All consumers will purchase a bundle at this price, so your total profits from this strategy are (\$500)(60) - \$30,000 = \$0.

12. Yes. It is consistent with cross subsidization. Phones and services are complements in demand. In addition, there may be cost complementarities and economies of scope since it is cheaper for providers to train employees to activate in-house phones rather than other brands purchased elsewhere. This strategy is also consistent with bundling. In this case, the company may say that the phone is "free," but in actuality it is part of a bundle that cannot be broken apart. For the reasons identified in the text, both cross subsidization and bundling can be used to enhance profits.

13. Set P = MC to obtain 3 - .5Q = 1 and solve to obtain the optimal package size, Q = 4 units. The total value to a consumer of package of 4 muffins is \$8 (computed as (.5)(\$3 – \$1)(4) + (\$1)(4) = \$8).

14. For reasons identified in the text, peak-load pricing is probably optimal in this situation. Under this plan, a higher price should be charged during peak winter months and a lower price charged during off-peak summer months.

15. Since the company manufacturers single engine planes, $Q_u = Q_d = Q$. Here, MR_d = 610,000 – 4,000Q; MC_d = 10,000; and MC_u = 8,000Q. Thus, $NMR_d = MR_d - MC_d$ = 610,000 – 4,000Q – 10,000 = 600,000 – 4,000Q. The optimal output equates NMR_d and MC_u: 600,000 – 4,000Q = 8,000Q. Solving yields Q = 50. The optimal transfer price is thus the upstream marginal cost of producing this level of output: $P_T = MC_u$ = 8,000(50) = \$400,000 per engine.

16. Probably the best you can do in this instance is charge different per-unit prices on weekends and weekdays. The optimal decision on weekends is determined by $15 - .002Q = 2$ (MR = MC). Solving yields Q = 6,500. The optimal price on weekends is thus P = 15 – .001(6500) = \$8.50. The optimal decision for weekdays is determined by $10 - .002Q = 2$. Solving yields Q = 4,000. The optimal weekday price is thus P = 10 –.001(4000) = \$6.

17. No, exactly the opposite. They reduce the incentive for price undercutting, thereby permitting firms to sustain higher prices and profits.

18. Profits are enhanced under peak-load pricing instead of the current uniform pricing scheme. During low-demand periods, BAA should charge airlines £1,350 each time the runway is used. The runway will be used 50 times per day at this price. These figures are found by solving $MR_2 = 1750\text{-}16Q = 950 = MC$ for quantity and substituting back into the equation for low demand to find price. During high-demand periods, BAA has zero excess capacity ($MR_1 = 2250\text{-}10Q = 950 = MC$ implies that Q = 130, which is greater than BAA's current capacity of 70 airplanes). Thus, the runway is used 70 times per day. BAA should charge a price equal to £1900 per runway use.

19. The profit-maximizing price when three firms compete is $P = \frac{3(-1.2)}{1+3(-1.2)}(15.40) = \$21.32$ per liter. If two of the three firms were unconditionally permitted to merge, then the profit-maximizing price is $P = \frac{2(-1.2)}{1+2(-1.2)}(15.40) = \$26.40$ per liter. Given the circumstances, it is not surprising that the FTC raised concerns about a proposed merger since price in the market for premium Scotch liquor would increase by almost 24 percent.