(1) [5 points] See the textbook (Section 8.6) for a discussion of Section 2 of the Sherman Act (1890). The most relevant part is "attempting to monopolize."

(2) [10 points] Because

$$e_a = \frac{\%\Delta q}{\%\Delta a} = 0.04 \quad \text{and} \quad e_p = \frac{\%\Delta q}{\%\Delta p} = -0.2,$$

by the Dorfman-Steiner formula the profit-maximizing ratio of advertising expenditure to sales revenue is given by

$$\frac{A}{p\,q} = \frac{A}{\$50 \text{ million}} = \frac{1}{5} = \frac{0.04}{-(-0.2)} = \frac{e_a}{-e_p}.$$

Hence, $A = \$10$ million.

(3a) [10 pts.] Setting a high price for CNN, $p_C = \$11$, results in 200 subscribers, hence a profit of $\pi_C = (11-1)200 = \$2000$. Setting a low price, $p_C = \$2$, results in 400 subscribers, hence a profit of $\pi_C = (2-1)400 = \$400$. Therefore, $p_C = \$11$ is profit maximizing. Similarly, BBC subscriptions should also be sold for $p_B = \$11$.

Setting a high price for HIS, $p_H = \$6$, results in 200 subscribers, hence a profit of $\pi_H = (6-1)200 = \$1000$. Setting a low price, $p_H = \$3$, results in 400 subscribers, hence a profit of $\pi_H = (3-1)400 = \$800$. Therefore, $p_H = \$6$ is the profit-maximizing price. Altogether, the total profit under no tying is $\pi^{NT} = 2000 + 2000 + 1000 = \$5000$.

(3b) [10 pts.] Setting a high package price, $p_{CBH} = \$19$, results in 200 subscribers, hence a profit of $\pi^{PT}(19) = (19-3)200 = \$3200$. Setting a low price, $p_{CBH} = \$16$, results in 400 subscribers, hence a profit of $\pi^{PT}(16) = (16-3)400 = \$5200$. Therefore, $p_{CBH} = \$16$ is the profit-maximizing price.

(3c) [5 pts.] Suppose now that the cable TV operator makes the following offer: Viewers can subscribe to a "news" package containing CNN and BBC for a price of $p_{CB} = \$13$ and the HIS(tory) channel for $p_H = \$6$. Inspecting the table reveals that all 400 consumers will subscribe to the "news" package whereas only 200 will subscribe to the HIS(tory) channel. Hence, total profit under mixed tying is

$$\pi^{MT} = (13-2)400 + (6-1)200 = \$5400 > \pi^{PT} = \$5200 > \pi^{NT} = \$5000.$$

Therefore, mixed tying is more profitable than either pure tying or no tying.

(4a) [10 points] If summer turns out to be the peak season, the airline should solve

$$\begin{aligned} MR_S(q_S) = 36 - q_S &= \$2 + \$4 = c + r, \quad \Longrightarrow q_S^{pl} = k^{pl} = 30 \\ MR_W(q_W) = 36 - 2q_W &= \$2 = c, \quad \Longrightarrow q_W^{pl} = 17 < k^{pl}. \end{aligned}$$

Therefore, $p_S^{pl} = \$21$ and $p_W^{pl} = \$19$.

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(4b)[10 points] Let $p = p_W = p_S$. In this case, the direct demand functions are:

$$q_S = 2(36 - p) > q_W = 36 - p, \quad \text{for all } p \geq 0.$$

The seller solves

$$\max_p \pi(p) = p(q_W + q_S) - (2+4)q_S - 2q_W$$
$$= p[2(36-p)] + p(36-p) - (2+4)[2(36-p)] - 2(36-p) = -3p^2 + 122p - 504.$$

The first-order condition yields $0 = d\pi/dp = 122 - 6p$. The second-order condition for a maximum is satisfied since $d^2\pi/dp^2 = -6 < 0$. Therefore, $p_{S,W} = 61/3 \approx \$20.33$.

(5a) [5 points] $p^{NW} = \rho V = 0.8 \cdot 40 = \$32$. $\pi^{NW} = \rho V - c = 0.8 \cdot 40 - 10 = \$22$

(5b) [10 points] $p^{FW} = V = \$40$.

$$\pi^{FW} = p^{FW} - \frac{c}{\rho} = 40 - \frac{10}{0.8} = \frac{320 - 100}{8} = \frac{55}{2} = \$27.5.$$

(5a) [5 points]

$$p^{PW} = \rho V + (1-\rho)20 = 0.8 \cdot 40 + 0.2 \cdot 20 = \$36.$$

Therefore, the profit is

$$\pi^{PW} = p^{PW} - c - (1-\rho)20 = 36 - 10 - 0.2 \cdot 20 = \$22 = \pi^{NW}.$$

Hence, this type of warranty yields the same profit as with no warranty.

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(6) [20 points] **Option A:** The probability that both labs do not discover is: $(1 - 0.75)^2 = 1/16$. Therefore, expected profit is given by

$$\pi = \left(1 - \frac{1}{16}\right) 16 - 2 \cdot 2 = \$11.$$

Option B: The probability that all three labs do not discover is: $(1 - 0.5)^3 = 1/8$. Therefore, expected profit is given by

$$\pi = \left(1 - \frac{1}{8}\right) 16 - 3 \cdot 1 = \$11.$$

Therefore, both options yield the same expected profit.

THE END

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