

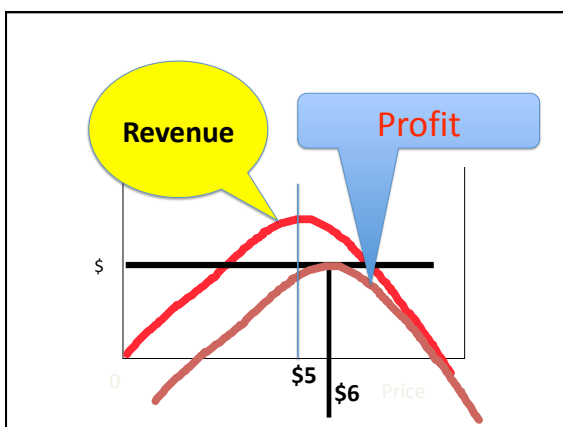
Answers to The Homework Questions

Ted Mitchell

- 1) The Market Research Department has estimated that the revenue in your Domestic market can be estimated by the following equation:
- Revenue = $600,000P - 3,000P^2$
where P = the selling price
- The product has a variable cost of \$20 per unit. Your boss wants you to charge the selling price that will maximize your sales revenue. When you charge the price that **maximizes revenue**, then your revenue will be _____.

- 1) The Market Research Department has estimated that the revenue in your Domestic market can be estimated by the following equation:
- Revenue = $600,000P - 3,000P^2$
Some of you remembered that
- $R = PQ = P(a - bP) = aP - bP^2$
the optimal selling price for maximizing revenue
- $P^* = a/2b = 600,000/2(3000) = \100
- **The question did not ask for the optimal Price**
- The product has a variable cost of \$20 per unit. Your boss wants you to charge the selling price that will maximize your sales revenue. When you charge the price that maximizes revenue, **then your revenue will be _____.**

- 1) The Market Research Department has estimated that the revenue in your Domestic market can be estimated by the following equation:
- Revenue = $600,000P - 3,000P^2$
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- The product has a variable cost of \$20 per unit. Your boss wants you to charge the selling price that will maximize your sales revenue. When you charge the price that **maximizes revenue**, then your revenue will be _____.
- $dR/dP = 600,000 - 2(3,000)P$
- $dR/dP = 600,000 - 2(3,000)P$ set = 0
- $600,000 - 6,000P = 0$
- Optimal P = $600,000/6,000 = \$100$ substitute into R
- $R = 600,000(100) - 3,000(100^2)$
- $R = 60,000,000 - 3,000(10,000)$
- $R = 60,000,000 - 30,000,000 = \$30,000$



- 2) The Market Research Department has estimated that the gross profit in your Domestic market can be estimated by the following equation:
- Profit = $PQ - VQ = (P - V)Q$
- where P = the selling price
 $Q = 600,000 - 3000P$
- The product has a variable cost of **V=\$20** per unit. Your boss wants you to charge the selling price that will maximize your profit. When you charge the price that **maximizes profit**, then your profit will be _____.

- 2) The Market Research Department has estimated that the gross profit in your Domestic market can be estimated by the following equation:
- Profit = $PQ - VQ$ or $(P - V)Q$
- where P = the selling price
 $Q = 600,000 - 3000P$
- The product has a variable cost of $V = \$20$ per unit. Your boss wants you to charge the selling price that will maximize your profit. When you charge the price that **maximizes profit**, then your profit will be _____.

Short method is to remember that the price that maximizes profit is to add half the variable cost to the price that maximizes revenue

Price for maximum revenue is \$100

Price for maximum profit is \$100 + V/2

$P = 100 + 20/2 = \$110$ substitute

$Z = (110 - 20)(600,000 - 3,000(110))$

$Z = 90(600,000 - 330,000) = \mathbf{\$24,300,000}$

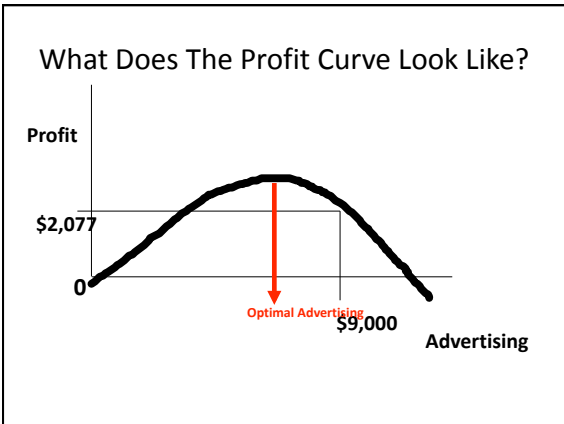
Longer method

- Profit = $P(a - bP) - V(a - bP)$
- Profit = $aP - bP^2 - \$20a + \$20bP$
- Profit = $600,000P - 3,000P^2 - 20(600,000) + 20(3,000)P$
- Profit = $600,000P - 3,000P^2 - 12,000,000 + 60,000P$
- Profit = $660,000P - 3,000P^2 - 12,000,000$
- $dZ/dP = 660,000 - 2(3,000)P$ **set = 0**
- $P = 660,000/6,000 = \$110$
- The profit at a price of \$110 per unit is
- $M = (P - V)(Q) = (\$110 - \$20) \times (600,000 - 3000(110)) = \mathbf{\$24,300,000}$

- 3) The Market Research department has estimated that advertising contributes to the number of units in the Home market. The number of units sold due to advertising can be estimated by the following equation:
- Quantity Sold = $80(\text{Advertising Expense}^{0.6}) = 80A^{0.6}$
- The product is selling at a price of \$30 per unit and the variable cost of making the product is \$25 per unit. The goal is to maximize the profit that is contributed by the advertising expenditure. When the **optimal level of advertising** is spent to maximize the profit after advertising (i.e., marketing contribution to net profit), then the **profit after advertising** is _____?

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You have to remember that Profit after Advertising is
 $\text{Profit} = (P - V)Q - A$
 $\text{Profit} = (P - V)(80)(A^{0.6}) - A$



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- The profit after advertising, M , is $M = (P - V)Q - A$
- $M = (P - V)kA^{0.6} - A = (\$30 - \$25)(80)(A^{0.6}) - A = 400(A^{0.6}) - A$
- $dM/dA = 0.6(400)(A^{-0.4}) - 1$ set = 0
- $(A^{-0.4}) = 1/240$
 $(1/A^{0.4}) = 1/240$
- $A^{0.4} = 240$
- $A^{0.4/0.4} = 240^{1/0.4}$
- $A^1 = 240^{1/0.4}$
 $A = 240^{2.5}$
- Optimal Advertising Expense = $A^* = 240^{2.5} = \$892,335$
- Substitute into the profit after advertising equation, M
- $M = 400(A^{0.6}) - A = 400(\$892,335^{0.6}) - \$892,335$
 $M = \$594,890$

- Any Questions?