5.5 Optimal Pricing - Profit Maximization

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Summary	• Profit Maximization

- What is marginal cost?
- Profit Maximizing Price

Profit function

- Typically, profit is the difference between the revenue and the cost.
- Assume that the marginal cost of producing the good is c.
- The profit function

$$\pi(p) = Total\ Revenue\ - Total\ Cost = \boxed{D(p)} * \boxed{p} - D(p) * c$$

sales

$$\pi(p) = D(p) * (p - c) = (\boxed{D_0 - m * p}) * (p - c)$$

For our example, the profit function is, $\pi(p) = (5842.8 - 157.7 * p)(p - c)$

Marginal cost is the cost of producing one unit.

- If d units are produced at the marginal cost of c, then Total cost $= d \times c$.

$$Total\ profit\ = Total\ Revenue\ - Total\ Cost$$

$$\pi(p) = D(p) \times p - D(p) \times c$$

$$= D(p) \times (p - c)$$

$$= (D_0 - mp) \times (p - c)$$

$$= D_0 p - mp^2 - D_0 c + mcp$$

$$\frac{\partial \pi(p)}{\partial p} = 0$$

$$D_0 - 2mp - 0 + mc = 0$$

$$2mp = D_0 + mc$$

$$\boldsymbol{p^* = \frac{D_0 + mc}{2m}}$$

Profit maximization

- To find the optimal price that maximizes profit, we again use the First Order Necessary Condition,

$$\frac{\partial \pi(p)}{\partial p} = D_0 - 2 * m * p - m * c$$

$$\frac{\partial \pi(p)}{\partial p} = 0 \Rightarrow \boxed{p^* = \frac{D_0 + m * c}{2 * m}}$$

Profit maximization

- For our numerical example, let the marginal cost be 15.
- So the profit maximizing price is,

$$p^* = \frac{5842.8 + 157.7 * 15}{2 * 157.7} = 26.02$$