5.4 Optimal Pricing - Revenue Maximization

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Summary	• Revenue Maximization

Price Optimization

Revenue Maximization

Profit Maximization

- Price is optimized based on what your objective is.

Demand response curve

- Let us assume a linear relationship between Price and Demand.
- From our previous discussion, a linear relationship between Price and Demand is of the type:

$$D(p) = D_0 + m * p$$

Where *D(p)* is the demand (as a function of price, *p*), D_0 is the market size (total demand when the price = 0), and *m* is the slope.

For the sample we had seen in the last session, this relationship was:

$$D(p) = 5842.8 \; - 157.7 * p$$

- Revenue Maximizing Price

Sales Revenue function

- Revenue from sales is always calculated as

$$Revenue = Demand * Price$$

$$R(p) = D(p) * p$$

$$R(p) = (\underbrace{\boxed{D_0 + m * p}}_{D(p)}) * p = D_0 * p + m * p^2$$

- For our numerical example, $R(p) = 5842.8 * p - 157.7 * p^2$

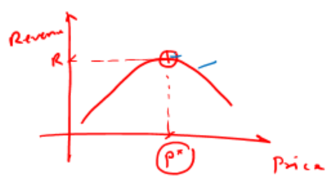
- Revenue, $R(p) = D(p) \times p = (D_o \; + \; mp) \times p$.
- You take derivative of $R(p)$ w.r.t p, set it 0 and get p^*.

$$R(p) = D(p) \times p = (D_o \; + \; mp) \times p$$
$$= D_o \, p \; + m \, p^2$$
$$\frac{\partial R(p)}{\partial p} = 0 \, .$$

$$D_o + 2mp = 0$$
$$\boldsymbol{p^* = -\frac{D_o}{2m}}$$

Revenue maximization

- We now find the optimal price that maximizes the revenue.
- From the First Order Necessary Condition, we find the partial derivative of the revenue function w.r.to *p*, and set it to be zero.



$$\frac{\partial R(p)}{\partial p} = 5842.8 - 157.7 * 2 * p$$

$$\frac{\partial R(p)}{\partial p} = 0 \Rightarrow \boxed{p^* = \frac{5842.8}{2 * 157.7} = 18.52}$$