$$m^2 = \frac{math}{minute}$$

Calculus: *Indeterminate Forms & L'Hospital's Rule*

Marginal Cost

The **marginal cost** is the additional cost added by increasing the quantity. This is also known as the *additional cost "at the margin."*

$$\text{Marginal Cost} = MC = C'(q)$$
$$\text{Marginal Cost} \approx C(q+1) - C(q)$$

Marginal Revenue

The **marginal revenue** is the additional revenue added by increasing the quantity. This is also known as the *additional revenue "at the margin."*

$$\text{Marginal Revenue} = MR = R'(q)$$
$$\text{Marginal Revenue} \approx R(q+1) - R(q)$$

Maximize/Minimize Profit using Marginal Cost and Revenue

When $MC = MR$ or $C'(q) = R'(q)$ then the profit is:

- Maximized given that $R(q) > C(q)$
- Minimized given that $C(q) > R(q)$
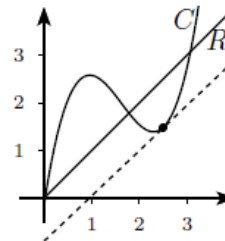
Maximize/Minimize Profit using Marginal Profit

Recall that, $Profit = Revenue - Cost$. Therefore,

$$Profit = Revenue - Cost$$
$$P = R - C$$
$$MP = MR - MC \qquad \text{differentiate both sides}$$
$$MP = 0 \qquad \text{profit is maximized when } MR = MC$$

Therefore, profit is maximized when **marginal cost** equals **marginal revenue** which is the same as saying when **marginal profit** equals *zero*.

$$C'(q) = R'(q) \qquad \text{or} \qquad P'(q) = 0$$