4.4

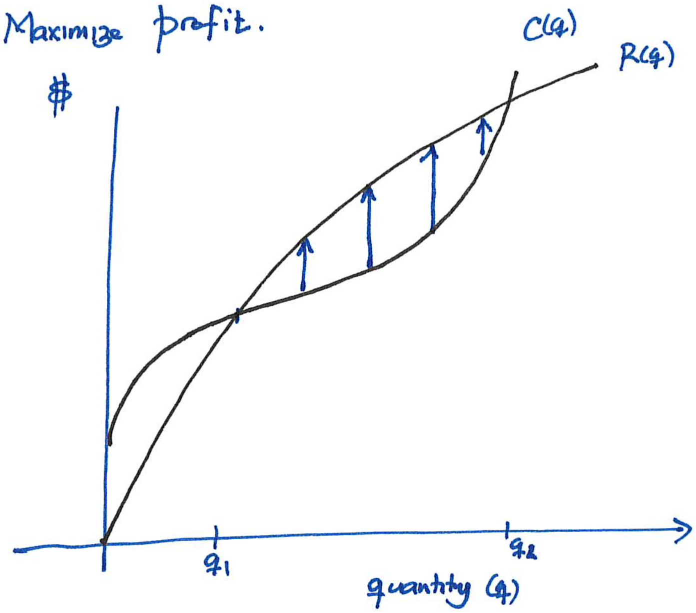
PROFIT, COST AND REVENUE

$$\text{PROFIT} = \text{REVENUE} - \text{COST}$$

$$\pi(q) = R(q) - C(q)$$

GOAL

Maximize profit.



The ideal level of production is $q_1 < q < q_2$.

From our critical point analysis we know that the maximum occurs when

$\pi'(q) = 0$.

$$\pi'(q) = R'(q) - c'(q)$$
$$= MR - MC$$

@ The maximum point of ~~production~~ profit $\pi'(q) = 0 \Rightarrow 0 = MR - MC.$

$\Rightarrow MR = MC.$

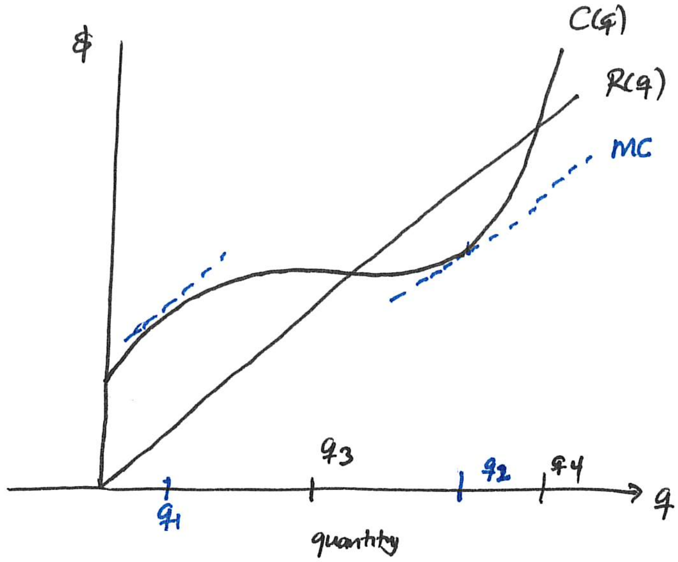
The maximum (or minimum) profit can occur when

Marginal profit $= 0$ i.e

Marginal revenue $=$ Marginal cost

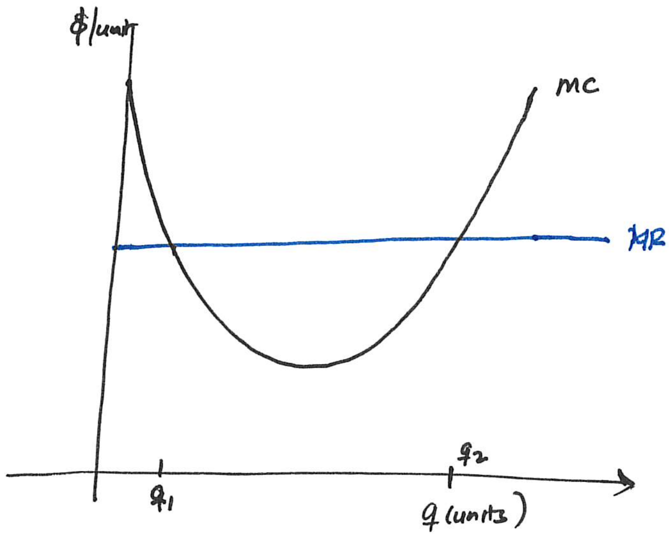
Infact to find the max/min of any function f, we find the ~~cst~~ critical points i.e $f'(x) = 0$ and solve and look for the local/max or min.

Example #1

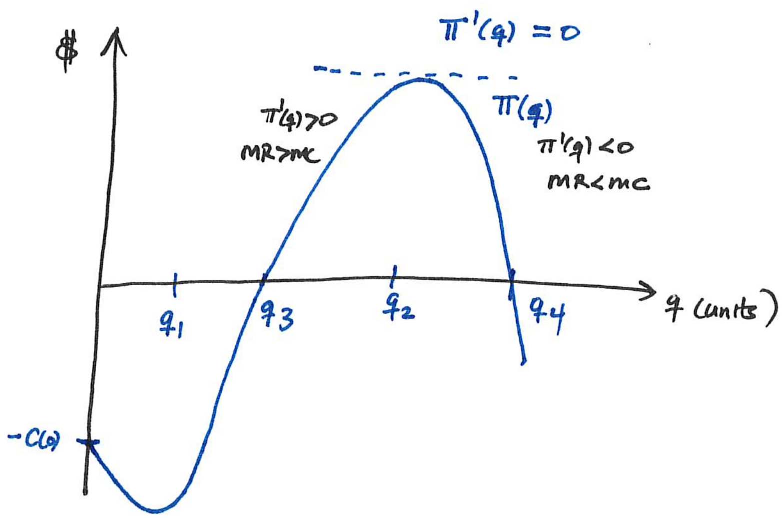


At the point q_2, $MC = MR$ so profit is maximized at q_2, between q_3 and q_4

We can sketch the Marginal revenue and Marginal cost



Profit function



$$a(q) = \frac{C(q)}{q} = \frac{q^3 - 12q^2 + 60q}{q} = q^2 - 12q + 60$$

Find critical point

$$a'(q) = 2q - 12q$$

$$2q - 12q = 0 \Rightarrow q = 6.$$

Check that this is a minimum.

$a''(q) = 2 > 0$ so $q = 6$ is a local minimum.

The Marginal cost (from $C(q) = q^3 - 12q^2 + 60q$) is

$$C'(q) = 3q^2 - \cancel{24}q + 60$$

$$MC(6) = 24.$$

The average cost $a(6) = 24$

go to Desmos plot of comparison.