Cost function $tc = c(q)$

Marginal cost function $mc = mc(q)$

generally $mc(q) \equiv c'(q)$

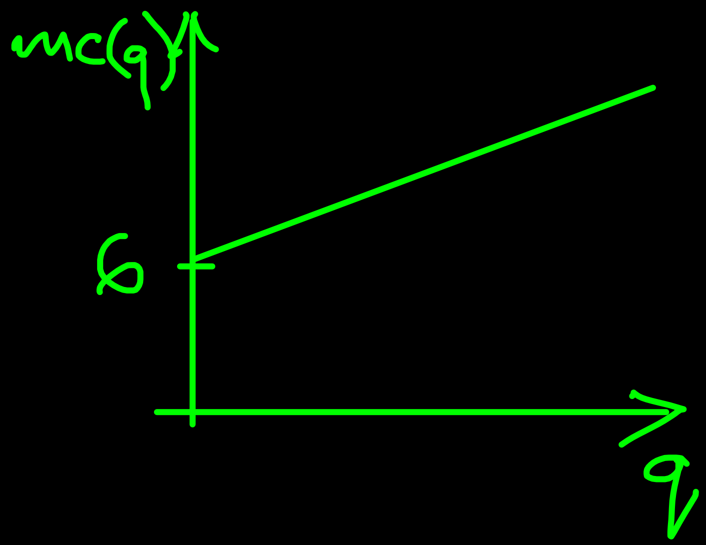
The hourly cost (in US dollars) of producing q kW of electricity per hour is given by

$$c(q) = 100 + 6q + 0.005q^2$$

Source: Alkhalil et al (2009) "Fuel consumption optimization of a multimachines microgrid"

$$c(q) = 100 + 6q + 0.005q^2$$

$$mc(q) = c'(q) = 6 + 0.01q$$



$$mc(0) = 6 + 0.01 \times 0 = 6$$

$$mc(10) = 6 + 0.01 \times 10 = 6.1$$

$$mc(100) = 7$$

$$mc(10000) = 106$$

Total revenue: $p \times q$

Total revenue function: $tr = r(q)$

$=$

- given demand function $q = q(p) \Rightarrow$
  inverse demand function $p = p(q) = q^{-1}(q)$

$\Rightarrow \quad r(q) = p(q)\,q$

Marginal revenue function: $mr = mr(q) = r'(q)$

Example: given $q = p^{-\alpha}$ $(\alpha > 0)$

$$\Rightarrow p^{-\alpha} = q \Rightarrow \underline{p(q) = q^{-1/\alpha}}$$

$$\Rightarrow r(q) = q\,p(q) = q \times q^{-1/\alpha} = q^{1-1/\alpha}$$

$$mr(q) = r'(q) = \left(1 - \frac{1}{\alpha}\right) q^{-1/\alpha}$$

more generally, given $r(q) = q\,p(q)$

- by product rule

$$mr(q) = r'(q) = \underline{p(q) + q\,p'(q)}$$