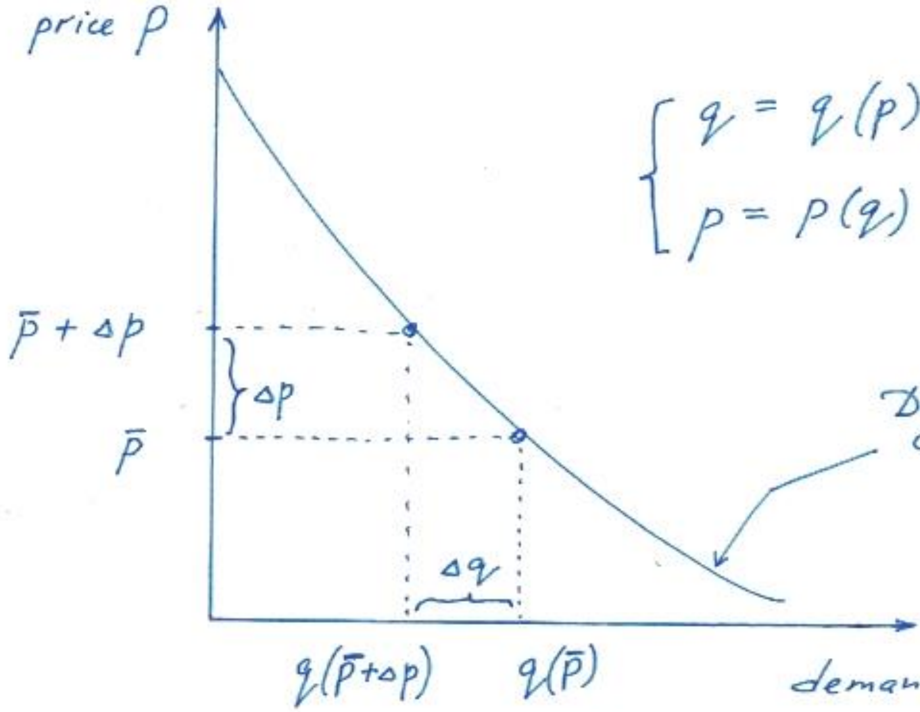
Market Demand & Elasticity.



$$\begin{cases} q = q(p) & \text{- demand function. (decreasing f.)} \\ p = p(q) & \text{- inverse demand f.} \end{cases}$$

$$E(\bar{p}) = \lim_{\Delta p \to 0} \frac{\Delta q / q(\bar{p})}{\Delta p / \bar{p}} = q'(\bar{p}) \frac{\bar{p}}{q(\bar{p})} \qquad (1)$$

Price elasticity estimates the relative demand change when the price increases in 1%.

$|E(\bar{p})| > 1$ elastic demand

$|E(\bar{p})| < 1$ inelastic demand

(1) Linear demand: $q = b - k \cdot p$, $p \in [0, \frac{b}{k}]$

(2) "Constant elasticity" demand: $q = a \cdot p^{-b}$, $p \in (0, +\infty)$

(3) Exponential demand: $q = a \cdot e^{-b \cdot p}$, $p \in [0, +\infty)$

Marginal Revenue & Elasticity

$R(q) = q \cdot p(q)$ - Revenue function

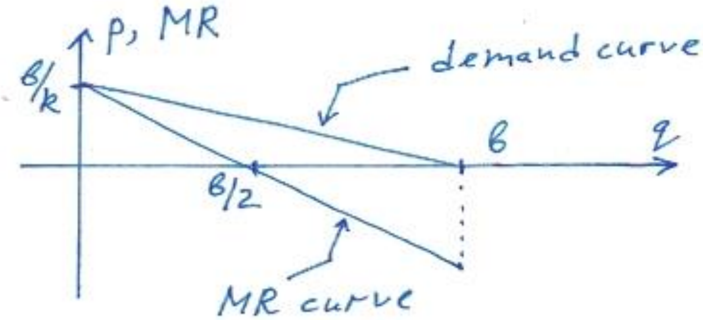
$$MR(q) = R'(q) = p(q) + q \cdot p'(q) = p(q) \cdot \left[1 + \frac{q}{p(q) \cdot q'(p)}\right]$$

$$\Rightarrow \quad MR(q) = p(q) \cdot \left(1 + \frac{1}{E(p(q))}\right) \qquad (2)$$

Linear demand: $q(p) = b - k \cdot p, \; p \in [0, b/k]$

or $p(q) = \frac{1}{k}(b - q), \; q \in [0, b]$

$$MR(q) = \frac{1}{k}(b - 2q)$$



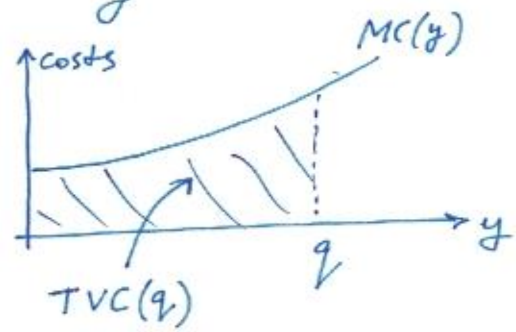
Costs

$y \geq 0$ - output

$TC(y) = FC + TVC(y)$, $AC(y) = \frac{TC(y)}{y}$,

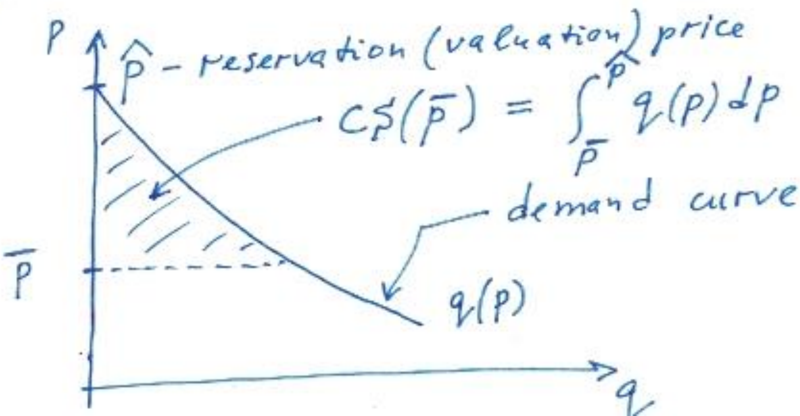
$MC(y) = TC'(y) = TVC'(y)$.

$$TC(q) = \int_0^q MC(y)\,dy + FC$$



Consumer's Surplus

measures the consumer's welfare given price $\bar{p}$.



Competitive Market. Perfect Competition.

Competitive firm takes the market price of output as being given (and outside of its control).

$$\begin{cases} \pi(q) = p^c \cdot q - TC(q) \longrightarrow \max \\ q \in [0, \bar{q} = q(p^c)] \end{cases}$$

interior solution $q^c \in (0, \bar{q})$: $MC(q^c) = p^c$ (3)