ELASTICITY

Here are some key points you need to remember and understand about Elasticity.

• p=price, q=quantity, Demand function is $f(p)$ **expressed in terms of** p.

• Elasticity of demand $E(p) = \frac{-pf'(p)}{f(p}$.

Demand is elastic at some price p_0 if $E(p) > 1$, or what is the same, if $(1 - E(p_0)) < 0$.

Demand is inelastic at some price p_0 if $E(p_0) < 1$, or what is the same, if $(1 - E(p_0) > 0)$.

Aim: To explain how elasticity is an indicator of the behaviour of revenue function to a change in price:

$R(p)$ = Revenue function **expressed in terms of price**, i.e. **as a function of** p.

$$R(p) = f(p).p.$$

By the product rule,

$$R'(p) = f(p) + p.f'(p) = f(p)\left(1 + \frac{pf'(p)}{f(p)}\right) = f(p)(1 - E(p)).$$

If demand is **elastic** at some price p_0, then, as $f(p)$ is always positive, we have

$E(p_0) > 1 \iff (1 - E(p_0))$ is negative $\implies R'(p_0) < 0 \implies R(p)$ is decreasing at p_0.

CONCLUSIONS:

• If demand is **elastic** at p_0, then an **increase in price will cause a decrease in revenue**.

$$E(p_0) > 1 \implies p \uparrow R \downarrow;\ p \downarrow R \uparrow$$

• If demand is **inelastic** at p_0, then **an increase in price will cause a increase in revenue**.

$$E(p_0) < 1 \implies p \uparrow R \uparrow;\ p \downarrow R \downarrow$$

• Change in revenue is in **the opposite direction of the change of price** when demand is **elastic** and **in the same direction** when demand is **inelastic.**