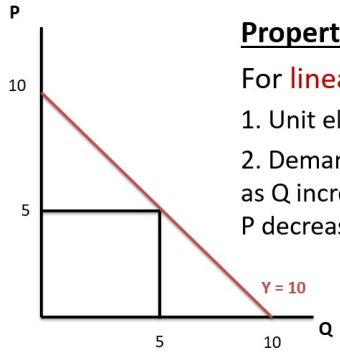
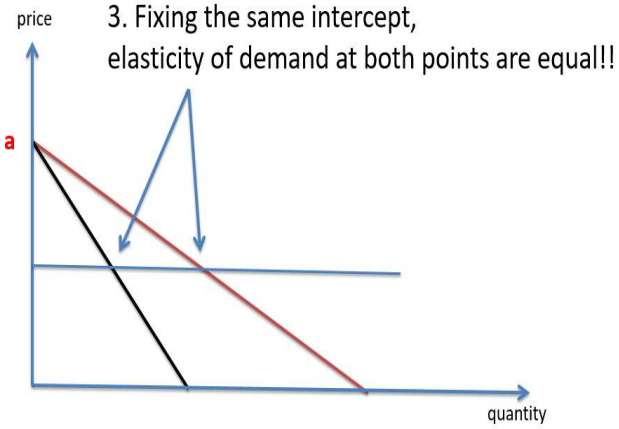
Linear function: slope v.s. elasticity



Property:

For linear demand curve:

1. Unit elasticity at the mid point.
2. Demand becomes more inelastic as Q increases, (correspondingly to P decreases)



3. Fixing the same intercept, elasticity of demand at both points are equal!!

Exercise 2.A:

2.A.1) Given a demand function by $p = a - bQ$, derive the formula for the elasticity of demand, and show that the third property holds

2.A.2) Given the market supply $p = c + dQ$ where $d \geq 0$, show that

(i) elasticity of supply is always greater than 1 if $c > 0$,

(ii) elasticity of supply is always eqaul to 1 if $c = 0$,

(iii) elasticity of supply is always less to 1 if $c < 0$.

2A.1) derive the formula elasticity of demand

- Elasticity of demand (price elasticity)

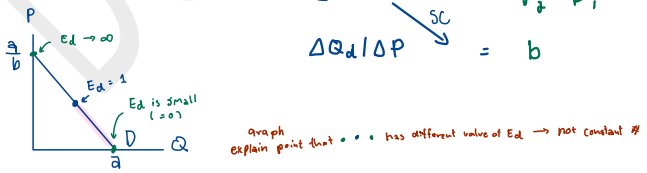
$$E_d = E_{Q_d, P} = \frac{\%\Delta Q_d}{\%\Delta P} = \frac{\%\Delta Q_d}{\%\Delta P} \cdot \frac{P}{Q_d}$$

Ex $Q_d = a - bP$, $\frac{\Delta Q_d}{\Delta P} = ? = \frac{Q_2 - Q_1}{P_2 - P_1} = \frac{(a - bP_2) - (a - bP_1)}{P_2 - P_1}$

① drop ② pull out b (distributive law) ③ then P_2 & P_1 and $P_2 - P_1$ will be cut and leave output shortcut with b ④

SC

$\Delta Q_d / \Delta P = b$



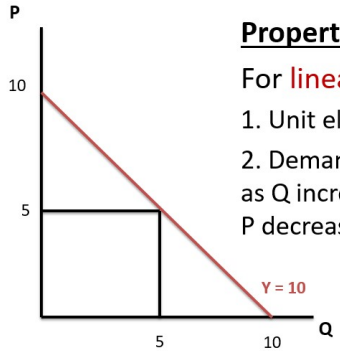
graph explain point that ... has different value of E_d → not constant #

$|E_d| < 1$ inelastic

$|E_d| = 1$ unit elastic

$|E_d| > 1$ elastic

Linear function: slope v.s. elasticity



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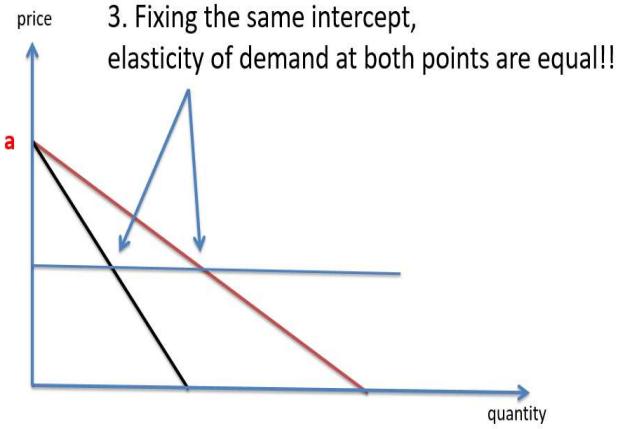

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2A.2) Market Supply

$\frac{dQ}{dP}$ in math

$= \frac{\%\,Q_S}{\%\,\Delta P} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q} = \frac{1}{d}\left(\frac{c+dQ}{Q}\right) = \frac{1}{d}\left(\frac{c}{Q}+d\right) = \frac{c}{d \cdot Q} + 1$

$\frac{\Delta P}{\Delta Q} = d \rightarrow \frac{\Delta Q}{\Delta P} = \frac{1}{\frac{\Delta P}{\Delta Q}} = \frac{1}{d}$

$\varepsilon^S_{Q,P} = \frac{c}{d+Q} + 1$

if $Q > 0 \rightarrow Q \rightarrow$ large $\frac{c}{dQ} \rightarrow$ "smaller"

if $c = 0 \rightarrow \varepsilon^S_{Q,P} = 1$

$c > 1 \rightarrow \varepsilon^S_{Q,P} > 1$

$c < 0 \rightarrow \varepsilon^S_{Q,P} < 1$