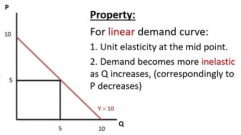
HW2.

Viphu 6304641738

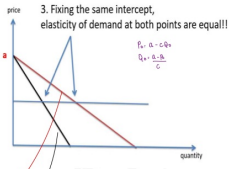
Linear function: slope v.s. elasticity



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!!

$P_0 = a - cQ_0$

$Q_0 = \frac{a-P_0}{c}$

$P = a - cQ$

use $\frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$

Exercise 2A:

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 equal to 1 if $c = 0$,

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

use $\frac{\%\Delta Q}{\%\Delta P}$

$PED = \frac{\Delta Q}{\Delta P} \cdot \frac{P_0}{Q_0}$

2.A.1

$P = a - bQ$

$Q_0 = \frac{a-P_0}{b}$

$Point\text{-}PED = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$

$= \frac{\Delta Q}{\Delta P} \times \frac{a-bQ_0}{\frac{a-P_0}{b}}$

$= \frac{\Delta Q}{\Delta P} \times \frac{a-b(\frac{a-P_0}{b})}{\frac{a-P_0}{b}}$

$\frac{\Delta Q}{\Delta P} \times \frac{a-b(a-P_0)}{(a-P_0)}$

$\frac{\Delta Q}{\Delta P} \times a-b$

$point\text{-}PED = -1 \times a-b$

$= -a+b$

$P_0 = a - cQ_0$

$Q_0 = \frac{a-P_0}{c}$

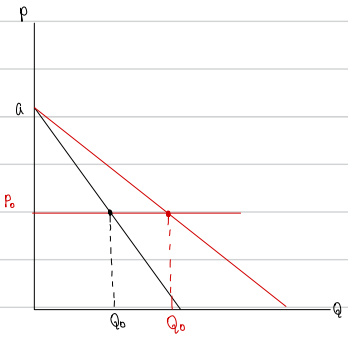
$Point\text{-}PED = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$

$= \frac{\Delta Q}{\Delta P} \times \frac{a-cQ_0}{\frac{a-P_0}{c}}$

$= \frac{\Delta Q}{\Delta P} \times a-c\frac{(a-P_0)}{(a-P_0)} \times \frac{c}{c}$

$= \frac{\Delta Q}{\Delta P} \times a-c$

$Point\text{-}PED = -a+c$



2.A.2) (i)

$P = c + dQ_0 \quad d_n = 2 \quad d_0 = 1 \quad C_0 = 1$

$Q_0 = \frac{c-P}{d}$

$\Delta Q = \frac{1-P}{2} - \frac{1-P}{1} = \frac{1-P-2+2P}{2}$

$= \frac{-1+P}{2}$

$\frac{1-P}{1}$

$= -\frac{1+P}{2} \times \frac{1}{1-P}$

$= \frac{1}{2}$

$\Delta P = 1+2(Q_1) - 1+1(Q_0) = \frac{0}{1+\frac{1}{2}(1-P)}$

$= \frac{1}{2-P}$

$\frac{\Delta Q}{\Delta P} = \frac{\frac{1}{2}}{\frac{1}{2-P}}$

$= \frac{1}{2} \times \frac{2-P}{1}$

$\frac{2-P}{2}$

$1 = \frac{2-P}{2}$

$1+2(Q_1) - 1+1(Q_0)$

$+\frac{1}{2}\left(\frac{1-P}{2}\right) - 1+\frac{1}{1}\left(\frac{1-P}{1}\right)$

$-P - 1+P$

1

(ii) $P_0 = c + dQ \quad d_n = 2 \quad C = 0$

$Q_0 = \frac{c-P}{d} \quad d_0 = 1 \quad C = 0$

$\Delta Q = \frac{Q_1 - Q_0}{Q_0} = \frac{0-P}{2} - \frac{0-P}{1}$

$= 0$

$\frac{\Delta Q}{\Delta P} = 0$

(iii) $P_0 = c + dQ \quad d_n = 2 \quad C = -1$

$Q_0 = \frac{c-P}{d} \quad d_0 = 1$

$\Delta Q = \frac{-1-P}{2} - \frac{-1-P}{1}$

$= \frac{-1-P-2-2P}{2}$

$= \frac{-1-P+2+2P}{2}$

$= \frac{1+P}{2}$

$\frac{-1-P}{1}$

$= \frac{1+P}{2} \times \frac{1}{-1-P}$

$= -\frac{1}{2}$

$\Delta P = -1+2Q - (-1+Q)$

$= \frac{2+Q}{-1+Q}$

$= \frac{-1+Q}{-1+Q}$

$\frac{\Delta Q}{\Delta P} = \frac{-\frac{1}{2}}{1} = -\frac{1}{2} \times 1$

1

2