HOMEWORK 2

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 $c < 0$.

$dQ = P - C$

$Q = \frac{P - C}{d}$

$Q = \frac{P}{d} - \frac{C}{d}$

2.A.1) Black line : $P = a - bQ \rightarrow Q = \left(-\frac{1}{b}\right)(P) + \frac{a}{b}$

Red line : $P = a - cQ \rightarrow Q = \left(-\frac{1}{c}\right)(P) + \frac{a}{c}$

Point-PED of Black line $= \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$

$= -\frac{1}{b} \times \frac{P_0}{Q_0} = -\frac{1}{b} \times \frac{P_0}{\frac{a - P_0}{b}}$

Point-PED of Red line $= -\frac{1}{c} \times \frac{P_0}{Q_0} = -\frac{1}{c} \times \frac{P_0}{\frac{a - P_0}{c}}$

Point-PED of Black line = Point-PED of Red line

$\left(-\frac{1}{b}\right)\left(P_0 \times \frac{b}{(a - P_0)}\right) = \left(-\frac{1}{c}\right)\left(P_0 \times \frac{c}{(a - P_0)}\right)$

$-1 = -1$ ※

2.A.2) use PES

(i) $Q = \frac{P - C}{d} = \frac{1}{d}(P) - \frac{C}{d}$

if $C > 0$; $PES = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$

$= \left(\frac{1}{d}\right) \times \frac{P_0}{\frac{P_0 - C}{d}}$

$= \left(\frac{1}{d}\right) \times P_0 \times \frac{d}{P_0 - C}$

$PES = \frac{P_0}{P_0 - C}$

$\therefore P_0 > P_0 - C$

↳ elasticity of supply is greter than 1 when $C > 0$

(ii) if $C = 0$; $PES = \frac{P_0}{P_0 - C}$

$= \frac{P_0}{P_0 - 0}$

$= \frac{P_0}{P_0}$

$PES = 1$

$\therefore P_0 = P_0$

↳ elasticity of supply is equal to 1 when $C = 0$

(iii) if $C < 0$;

$PES = \frac{P_0}{P_0 - C}$

$\therefore P_0 < P_0 - C$

↳ elasticity of supply is lower than 1 when $C < 0$