Exercise 2.A:

$p : a - cQ$

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 $c < 0$.

2.A.1

$P = a - bQ$

- $\varepsilon_p = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0} = -b \times \frac{a - bQ_0}{\frac{a - P_0}{b}} = -b \times a - bQ_0 \times \frac{b}{a - P_0} = \frac{-b^2(a - bQ)}{a - P_0}$ #

$$\begin{cases} P_0 = a - bQ_0 \\ Q_0 = \frac{a - P_0}{b} \end{cases} \qquad \frac{\Delta Q}{\Delta P} = -b$$

$P = a - cQ$, $P_0 = a - cQ_0$ $\qquad Q_0 = \frac{a - P_0}{c}$

- $\varepsilon_p = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0} = -c \times \frac{a - cQ_0}{\frac{a - P_0}{c}} = -c \times a - cQ_0 \times \frac{c}{a - P_0} = \frac{-c^2(a - cQ_0)}{a - P_0}$ #

2.A.2

$$p = c + dQ$$

$$\varepsilon_s = \frac{\%\Delta Q^s}{\%\Delta P} = \frac{\frac{\Delta Q}{Q}}{\frac{\Delta P}{P}} = \overset{\frac{dQ}{dP}}{\frac{\Delta Q}{\Delta P}} \cdot \frac{P}{Q} = \frac{1}{d}\left(\frac{c + dQ}{Q}\right) = \frac{1}{d}\left(\frac{c}{Q} + d\right) = \frac{c}{d \cdot Q} + 1$$

$$\therefore \varepsilon^s_{Q,P} = \frac{c}{d \cdot Q} + 1$$

if $Q > 0 \rightarrow Q \rightarrow$ large $\quad \frac{c}{dQ} \rightarrow$ smaller ; if $c = 0$, $\varepsilon^s_{Q,P} = 1$

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

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