

## 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 equal to 1 if  $c = 0$ ,
- (iii) elasticity of supply is always less than 1 if  $c < 0$ .

$$2.A.1) \quad p = a - bQ$$

$$bQ = a - p$$

$$Q = \frac{a - p}{b}$$

$$\text{And elasticity demand} = \frac{\Delta Q}{\Delta p} \times \frac{p_0}{Q_0}$$

$$= -\frac{1}{b} \times \frac{p_0}{a - p_0}$$

$$p = a - cQ$$

$$cQ = a - p$$

$$Q = \frac{a - p}{c}$$

$$= -\frac{1}{c} \times \frac{p_0}{a - p_0}$$

$$2.A.2) \quad p = c + dQ$$

$$p - c = dQ$$

$$\frac{p - c}{d} = Q$$

$$PED = \frac{\% \Delta Q_s}{\% \Delta p} = \frac{Q_1 - Q_0}{Q_0} \times \frac{p_0}{p_1 - p_0}$$

$$\text{i) } c > 0, d \geq 0$$

$$p = 2 + 1Q$$

$$(2, 4) \quad (4, 6)$$

$$PED = \frac{4 - 2}{2} \times \frac{4}{6 - 4} = \frac{1}{1} = 1$$

$$= 2 > 1$$

$\therefore$  elasticity of supply is greater than 1

$$\text{ii) } c = 0, d \geq 0$$

$$p = 2Q$$

$$(1, 2) \quad (2, 4)$$

$$PED = \frac{2 - 1}{1} \times \frac{2}{4 - 2} = \frac{1}{1} = 1$$

$\therefore$  elasticity of supply is equal to 1

$$\text{iii) } c < 0, d \geq 0$$

$$p = -3 + 2Q$$

$$(3, 3) \quad (4, 5)$$

$$PED = \frac{4 - 3}{3} \times \frac{3}{5 - 3} = \frac{1}{2} \times \frac{3}{2} = 0.5$$

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

$$= 0.5 < 1$$

$\therefore$  elasticity of supply is less than 1