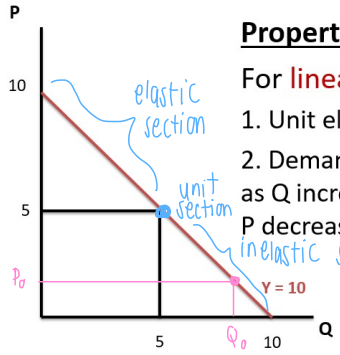
Linear function: slope v.s. elasticity



Property:

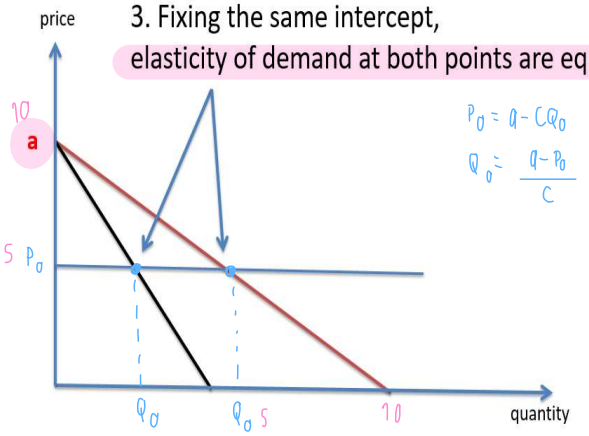
For linear demand curve:

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

$PED = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0} < 1$

caution

steep demand curve may lead you to think that it is inelastic but this is NOT true



Exercise 2.A:

use $\frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$ or point-PES hint: $\frac{\% Q_S}{\% \Delta P} = \frac{\frac{Q_1 - Q_0}{Q_0}}{\frac{P_1 - P_0}{P_0}}$

$P = a - CQ$

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) $P_0 = a - CQ_0$

$5 = 10 - C(5)$

$-C = \frac{5-10}{5}$

$C = \frac{5}{5} = 1$

$5 = 10 - 1(Q_0)$

$Q_0 = \frac{5-10}{-1}$

$Q_0 = 5$

2.A.2)

(i) $d = 1, c > 0 : C = 2$

$P = 2 + Q$

$Q = P - 2$ $(4, 6), (8, 10)$

$Q = 4$, $P = 6$ or $Q = 8$, $P = 10$

$PES = \frac{\frac{8-4}{4}}{\frac{10-6}{6}} = 1.5$

(ii) $d = 2, C = 0$

$P = 2Q$

$\frac{1}{2}P = Q$ $(2, 4)$ $(6, 12)$

$P = 12$, $Q = 6$ or $P = 4$, $Q = 2$

$PES = \frac{\frac{6-2}{2}}{\frac{12-4}{4}} = 1$

(iii) $d = 2, C = -4$

$P = -4 + 2Q$

$P + 4 = 2Q$ $(4, 6)$

$P = 4$, $Q = 6$ or $P = 8$, $Q = 4$ $(8, 4)$

$PES = \frac{\frac{6-4}{4}}{\frac{8-4}{4}} = 0.5$

HW