3. Suppose the price elasticity of demand for heating oil is 0.2 in the short run and 0.7 in the long run.

   a. If the price of heating oil rises from \$1.80 to \$2.20 per gallon, what happens to the quantity of heating oil demanded in the short run? In the long run? (Use the midpoint method in your calculations.)

   b. Why might this elasticity depend on the time horizon?

a) $P_0 = 1.80 \Rightarrow \eta_s = 0.2$

$P_1 = 2.20 \Rightarrow \eta_L = 0.7$

$\%\Delta P = \frac{(2.2 - 1.8)}{2} \cdot 100 = 20\%$

$\eta_s \Rightarrow 0.2 = \frac{\%\Delta Q_D}{20\%}$

$\%\Delta Q_D = 4\%$

$\eta_L = 0.7 = \frac{\%\Delta Q_D}{20\%}$

$\%\Delta Q_D = 14\%$

∴ The quantity of heating oil demanded in short run and long run will be 4% and 14% respectively

b) Because, in the short run. consumers can change their mind by buying other products . but they will buy other sources instead for a long run.

7. Suppose that your demand schedule for pizza is as follows:

Price (Y)	Quantity Demanded (X) (income = $20,000)	Quantity Demanded (income = $24,000)
$8	Q_0 40 pizzas	50 pizzas
10	Q_1 32	45
12	24	30
14	16	20
16	8	12

a. Use the midpoint method to calculate your price elasticity of demand as the price of pizza increases from $8 to $10 if (i) your income is $20,000 and (ii) your income is $24,000.

b. Calculate your income elasticity of demand as your income increases from $20,000 to $24,000 if (i) the price is $12 and (ii) the price is $16.

a) (I) $P_0 = 8$, $Q_0 = 40$ & $P_1 = 10$, $Q_1 = 32$

$$\text{slope} = \frac{P_1 - P_0}{Q_1 - Q_0} = \frac{10-8}{32-40} = -\frac{1}{4}$$

$$\eta_D = \frac{\% \Delta Q_S}{\% \Delta P} = \frac{1}{\text{slope}} \cdot \frac{(P_1 + P_0)}{(Q_1 + Q_0)}$$

$$= \frac{1}{-1/4} \cdot \frac{(10+8)}{(32+40)}$$

$$= (-4) \cdot \frac{\cancel{18}^{1}}{\cancel{72}_{4}}$$

$$\therefore \eta_D = -1$$

(II) $P_0 = 8$, $Q_0 = 50$ & $P_1 = 10$, $Q_1 = 45$

$$\text{Slope} = P_1 - P_0 / Q_1 - Q_0 = \frac{10-8}{45-50} = -\frac{2}{5}$$

$$\eta_D = \frac{1}{-2/5} \cdot \frac{(10+8)}{(45+50)}$$

$$= -\frac{\cancel{5}^{1}}{\cancel{2}} \cdot \frac{\cancel{18}^{9}}{\cancel{95}_{19}}$$

$$\therefore \eta_D = -\frac{9}{19}$$

b) (I) $I_0 = 20{,}000$, $Q_0 = 24$ & $I_1 = 24{,}000$, $Q_1 = 30$

$$\eta_D = \frac{\% \Delta Q_D}{\% \Delta I}$$

$$\% \Delta Q_D = \frac{(30-24)}{24} \cdot 100 = \frac{\cancel{6}^{1}}{\cancel{24}_{4}} \cdot 100 = 25\%$$

$$\% \Delta I = \frac{(24{,}000 - 20{,}000)}{20{,}000} \cdot 100 = \frac{\cancel{4{,}000}^{1}}{\cancel{20{,}000}_{5}} \cdot 100 = 20\%$$

$$\therefore \eta_D = \frac{25\%}{20\%} = 1.25$$

(II) $I_0 = 20{,}000$, $Q_0 = 8$ & $I_1 = 24{,}000$, $Q_1 = 12$

$$\% \Delta Q_D = \frac{(12-8)}{8} \cdot 100 = \frac{\cancel{4}^{1}}{\cancel{8}_{2}} \cdot 100 = 50\%$$

$$\% \Delta I = \frac{(24000-20000)}{20000} \cdot 100 = \frac{\cancel{4000}^{1}}{\cancel{20000}_{5}} \cdot 100 = 20\%$$

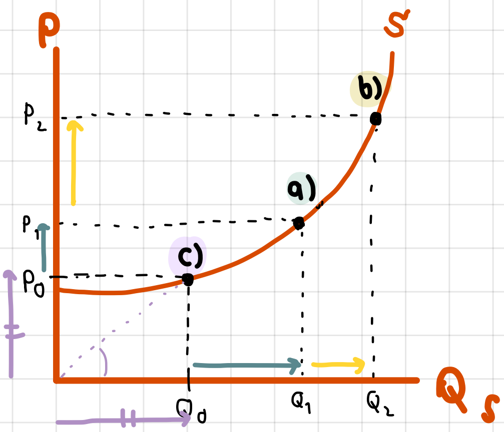
$$\therefore \eta_D = \frac{50\%}{20\%} = 2.5$$

H.W.

Find the points on S that has

a) $\eta_s > 1$, b) $\eta_s < 1$, c) $\eta_s = 1$

↳ elastic ↳ inelastic



a) $\eta_s > 1$; $\frac{\%\Delta Q}{\%\Delta P} > 1 \rightarrow \%\Delta Q > \%\Delta P$

b) $\eta_s < 1$; $\frac{\%\Delta Q}{\%\Delta P} < 1 \rightarrow \%\Delta Q < \%\Delta P$

c) $\eta_s = 1$; $\frac{\%\Delta Q}{\%\Delta P} = 1 \rightarrow \%\Delta Q = \%\Delta P$