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HW#5 Due February 25, 2021

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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?

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

Price	Quantity Demanded (income = $20,000)	Quantity Demanded (income = $24,000)
$8	40 pizzas	50 pizzas
10	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.

3. a) Short Run (midpoint method)

$$\eta_D = \frac{\text{percent change in quantity demand}}{\text{percent change in price}}$$

$$0.2 = \frac{\%\Delta Q_D}{\frac{(2.2-1.8)}{\left(\frac{2.2+1.8}{2}\right)}}$$

$$0.2 = \frac{\%\Delta Q_D}{\frac{\cancel{0.4}\ 0.2}{\cancel{2}}}$$

$$\%\Delta Q_D = 0.04$$

∴ The quantity demand decrease by 4%. The reason that it decrease due to the law of demand.

Long Run

$$\eta_D = \frac{\text{percent change in quantity demand}}{\text{percent change in price}}$$

$$0.7 = \frac{\%\Delta Q_D}{\frac{(2.2-1.8)}{\left(\frac{2.2+1.8}{2}\right)}}$$

$$0.7 = \frac{\%\Delta Q_D}{\frac{\cancel{0.4}\ 2}{\cancel{2}}}$$

$$\%\Delta Q_D = 0.14$$

∴ The quantity demand decrease by 14%

b) Elasticity depend on what will be the substitute. More time mean there are more chance for the consumer to find more or even a better substitute so this is why elasticity is depend on a time horizon.

7. a) i) ①

$$\eta_D = \frac{\text{percent change in quantity demand}}{\text{percent change in price}}$$

$$= \frac{\dfrac{32-40}{\left(\frac{32+40}{2}\right)}}{\dfrac{10-8}{\left(\frac{10+8}{2}\right)}}$$

$$= \frac{-0.22}{0.22}$$

$$= -1 \text{ Ans}$$

②

$$\eta_D = \frac{1}{\text{slope}} \cdot \frac{\bar{P}}{\bar{Q}}$$

$$= \frac{1}{\frac{\cancel{10-8}\ 2}{\cancel{32-40}\ -8}} \cdot \frac{\left(\frac{10+8}{2}\right)}{\left(\frac{32+40}{2}\right)}$$

$$= \frac{-8}{2} \cdot \frac{9}{36}$$

$$= -1 \text{ Ans}$$

ii) ①

$$\eta_D = \frac{\text{percent change in quantity demand}}{\text{percent change in price}}$$

$$= \frac{\dfrac{45-50}{\left(\frac{45+50}{2}\right)}}{\dfrac{10-8}{\left(\frac{10+8}{2}\right)}}$$

$$= \frac{-\frac{2}{19}}{\frac{2}{9}}$$

$$= -0.474 \text{ Ans}$$

②

$$\eta_D = \frac{1}{\text{slope}} \cdot \frac{\bar{P}}{\bar{Q}}$$

$$= \frac{1}{\frac{\cancel{10-8}\ 2}{\cancel{45-50}\ -5}} \cdot \frac{\left(\frac{10+8}{2}\right)}{\left(\frac{45+50}{2}\right)}$$

$$= \frac{-5}{2} \cdot \frac{9}{47.5}$$

$$= -0.474 \text{ Ans}$$

b) i)

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

$$= \frac{\dfrac{30-24}{24}}{\dfrac{24{,}000-20{,}000}{20{,}000}}$$

$$= \frac{5}{4} \text{ or } 1.25 \text{ Ans}$$

ii)

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

$$= \frac{\dfrac{12-8}{8}}{\dfrac{24{,}000-20{,}000}{20{,}000}}$$

$$= \frac{5}{2} \text{ or } 2.5 \text{ Ans}$$