HW#7 Due Feb 15, 2022

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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. Price elasticity of demand in short run = 0.2
long run = 0.7

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?

- Elasticity depends on the time horizon because there is a possibility of substitutes for heating oil in the market. It is likely that people might be prefer other source of heating oil in future in case of rise in its prices.

a. $PED = \dfrac{\% \Delta Q_d}{\dfrac{P_2 - P_1}{\dfrac{P_1 + P_2}{2}}}$

$0.2 = \dfrac{\% \Delta Q_d}{\dfrac{2.2 - 1.8}{\dfrac{1.8 - 2.2}{2}}}$

$0.2 = \dfrac{\% \Delta Q_d}{\dfrac{0.4}{2}}$

$\% Q_d = (0.2 \times 0.4) \div 2 = 0.04$

∴ The quantity of heating oil demanded will decrease by 4% in short run.

In long run:

$0.7 = \dfrac{\% \Delta Q_d}{\dfrac{2.2 - 1.8}{\dfrac{1.8 + 2.2}{2}}}$

$0.7 = \dfrac{\% \Delta Q_d}{\dfrac{0.4}{2}}$

$\% \Delta Q_d = (0.7 \times 0.4) \div 2 = 0.14$

∴ The quantity of heating oil demanded will decrease by 14% in long run.

7.

a. i) when income = 20,000

$$PED = \frac{\% \Delta \text{ in } Q_d}{\% \Delta \text{ in } P}$$

$$PED = \frac{Q_2 - Q_1}{(Q_2 + Q_1)/2} \div \frac{P_2 - P_1}{(P_2 + P_1)/2}$$

$P_1 = 8$ $Q_1 = 40$

$P_2 = 10$ $Q_2 = 32$

$$PED = \frac{32-40}{(32+40)/2} \div \frac{10-8}{(10+8)/2} = \frac{-8}{36} \div \frac{2}{9} = \frac{-0.22}{0.22} = -1$$

$PED = -1$

ii) when income = 20,000

$P_1 = 8$ $Q_1 = 50$

$P_2 = 10$ $Q_2 = 45$

$$PED = \frac{45-50}{(45+50)/2} \div \frac{10-8}{(10+8)/2} = \frac{-5}{47.5} \div \frac{2}{9} = \frac{-0.11}{0.22} = -0.5$$

$PED = -0.5$

b. When Price is 12:

$$\text{Income elasticity of demand} = \frac{\% \Delta \text{ in } Q_d}{\% \Delta \text{ in income}}$$

$$= \frac{Q_2 - Q_1}{(Q_2 + Q_1)/2} \div \frac{Y_2 - Y_1}{(Y_2 + Y_1)/2}$$

$Q_1 = 24$ $Y_1 = 20,000$

$Q_2 = 30$ $Y_2 = 24,000$

$$\text{Income elasticity of demand} = \frac{30-24}{(30+24)/2} \div \frac{24000-20000}{(24,000+20,000)/2} = \frac{6}{27} \div \frac{4000}{22,000}$$

$$= \frac{0.22}{0.18} = 1.22$$

$YED = 1.22$

ii) When Price is 16:

$Q_1 = 8$ $Y_1 = 20,000$

$Q_2 = 12$ $Y_2 = 24,000$

$$YED = \frac{12-8}{(12+8)/2} \div \frac{24,000-20,000}{(24,000-20,000)/2} = \frac{4}{10} \div \frac{4,000}{22,000} = \frac{0.4}{0.18} = 2.2$$

$YED = 2.2$