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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.

a) in short run :

$$\eta_D = \frac{\%\Delta Q_D}{\%\Delta P} = \frac{\%\Delta Q_D}{\frac{2.2-1.8}{1.8}} = 0.22$$

$$0.2 = \frac{\%\Delta Q_D}{0.22}$$

$$0.044 = \%\Delta Q_D$$

meaning that the quantity demanded of the heating oil will decrease by 4.4% in short run.

in long run :

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

$$0.7 = \frac{\%\Delta Q_D}{0.22}$$

$$0.154 = \%\Delta Q_D$$

meaning that the quantity demanded of heating oil will decrease by 15.4% in long run.

b) Because there are some substitutes for heating oil. It is possible that people might use some other source of heating oil in the future.

7.

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a) ① when income = 16,000

$\eta_D = \frac{\%\Delta Q_D}{\%\Delta P}$ $P_1 = 8$ $Q_1 = 40$ $P_2 = 10$ $Q_2 = 32$

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

$= \frac{32-40}{(32+40)/2} \div \frac{10-8}{(10+8)/2}$

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

$= -1$

b) when income = 20,000

$P_1 = 8$ $Q_1 = 50$

$P_2 = 10$ $Q_2 = 45$

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

$= \frac{45-50}{(45+50)/2} \div \frac{10-8}{(10+8)/2}$

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

$= -0.5$

b) when the price is $12

Income elasticity of demand

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

$= \frac{30-24}{(30+24)/2} \div \frac{24,000-20,000}{44,000/2}$

$= 1.22$

when the price is $16

$= \frac{12-8}{20/2} \div \frac{24,000-20,000}{44,000/2}$

$= \frac{4}{10} \times \frac{22,000}{2000}$

$= 4.4$