Ch 4, 5, 7

HW#5 Due September 22, 2020

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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.) ↓ in QD, price 1.8 → 2.20 | $\eta_D = \frac{\%\Delta Q_D}{\%\Delta P}$

   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 (new)	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.

3.7

a. price 1.8, 2.2 η_D: 0.2, 0.7

- $\eta_D = \frac{\%\Delta Q_D}{\%\Delta P} = \frac{\text{Percentage change in } Q_D}{\text{Percentage change in Price}}$ → midpoint using Price, Q_D

From (a) $\%\Delta Q_D = X$

$0.2 = X$

↓ new-old ($Q_2 - Q_1$)

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

$0.2 = \frac{X}{\frac{2.2-1.8}{2} \times 100}$ → midpoint

$\frac{2.2+1.8}{2}$

$0.2 = \frac{X}{20} = -4$ → law of demand: price ↑ D ↓

∴ In short run there's a decrease in percentage change in quantity demand of 4

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

$0.7 = \frac{X}{\frac{2.2-1.8}{2} \times 100}$

$0.7 = \frac{X}{20}$

$-1.4 = X$ → price ↑ D ↓

∴ In short run there's a decrease in % change in Q_D of 1.4

(b.) If in the long run there will be more elasticity because people can find substitutes compare to the short run.

7.a) price 8, 10 income 20,000 / 24,000

i) QD = 40, 32

$$\eta_D = \frac{\%\Delta QD}{\%\Delta P} \quad \text{midpoint}$$

$$\eta_D = \frac{\frac{32-40}{\frac{32+40}{2}}}{\frac{10-8}{\frac{10+8}{2}}} = \frac{-\frac{8}{36}}{\frac{2}{9}} = \left(-\frac{\cancel{8}^{4}}{\cancel{36}_{4}}\right)\left(\frac{9}{2}^{1}\right) = -\frac{4}{4} = -1$$

ii) QD = 50, 45

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

47.5

$$\eta_D = \frac{\frac{45-50}{\frac{45+50}{2}}}{\frac{10-8}{\frac{10+8}{2}}} = \frac{\frac{-5}{\frac{95}{2}}}{\frac{2}{9}} = -\cancel{5}^{1}\left(\frac{2}{\cancel{95}_{-19}}\right)\left(\frac{9}{2}\right) = \left(-\frac{2}{19}\right)\left(\frac{9}{\cancel{2}}\right) = \frac{-9}{19}$$

7.b) price 12, 16

income 20,000 and 24,000
(i) (ii)

(i) $\eta_D = \frac{\%\ QD}{\%\ DI}$

$$= \frac{\frac{30-24}{\frac{30+24}{2}}}{\frac{24,000-20,000}{\frac{24,000+20,000}{2}}} = \frac{\frac{6}{27}}{\frac{4,000}{22,000}} = \frac{2}{9} \cdot \frac{22}{2} = \frac{22}{18} = \frac{11}{9}$$

(ii) $\eta_D = \frac{\%\ \Delta QD}{\%\ \Delta I}$

$$= \frac{\frac{12-8}{\frac{12+8}{2}}}{\frac{24,000-20,000}{\frac{24,000+20,000}{2}}} = \frac{4}{10} \cdot \frac{22}{4} = \frac{11}{5}$$