

Chapter 5 Problem Sets

Elasticity

1) PS05 \\ Elasticity Problems \\ 1 \\

Compute the elasticities for the following problems.

- 4.14 1. The Hobbit family buys 72 vegetarian specials annually at a price of \$3.00 each but would consume 192 per year if the price dropped to \$2.40. Their price elasticity of demand is ?
- 1.69 2. The Sea Slug Glee Club bought 170 motor scooters when the price was \$875 each, but ordered only 30 when the price soared to \$2,125. The group's price elasticity of demand for scooters is ___?
- .60 3. If diet faddists gulp 205 million unsweetened "No-Carb" milkshakes at \$2.30 apiece, but cut back to 155 million weekly when the price rises to \$3.70 each, the price elasticity of their demand for shakes equals ___?
- 2.45 4. If a \$9.98 sale on regular \$19.95 watch fobs raises a store's sales from 30 to 300 per week, the price elasticity of the demand faced by the store is roughly ___?
- +12.5 5. If a strong recovery raises national income from \$12.0 trillion to \$13.2 trillion and diamond sales jump from 3 to 13 million carats annually, the income elasticity of demand for diamonds is ___?
- 2 6. If each 1% hike in the price of pencils causes a 2% decline in the quantity of erasers sold, the price cross-elasticity of demand for these complementary goods is roughly?
- +.86 7. When John Whittler can sell totem poles for \$1,800 each, he markets 60 annually, but when the price falls to \$600 apiece, he is willing to sell only 24 each year. His price elasticity of supply is ___?
- +1.94 8. When the temperature drops from 102° F to 54° F, sales of surf boards slip from 56,000 monthly down to 14,000 for diehard surfers. The temperature elasticity of the demand for surf boards is ___?
- +3.05 9. When 200,000 gallons of water are applied per acre, 4 tons are harvested from each acre of linguini trees annually, but cutting back to 160,000 gallons causes the crop per acre to fall to 2 tons annually. The water elasticity of linguini production is ___?
- 1 10. If doubling your viewing of soap operas to 16 hours per week causes your IQ score to fall from a genius level of 140 to a sluggish 70, your TV elasticity of brain power is ___?

$$1.) E = \frac{\frac{192-72}{\frac{72+192}{2}}}{\frac{2.40-3.00}{\frac{3.00+2.40}{2}}} = \frac{\frac{120}{\frac{264}{2}}}{\frac{-0.60}{\frac{5.40}{2}}} = \frac{\frac{120}{132}}{\frac{-0.60}{2.70}} = \frac{\uparrow .91}{\downarrow -.22} = -4.14$$

\rightarrow or 414%
 \downarrow negative E means inverse relationship between price and quantity

* Quantity demanded increases 4.14 times faster than price falls

$$2.) E = \frac{\frac{30-170}{\frac{170+30}{2}}}{\frac{2125-875}{\frac{875+2125}{2}}} = \frac{\frac{-140}{\frac{200}{2}}}{\frac{1250}{\frac{3000}{2}}} = \frac{\frac{-140}{100}}{\frac{1250}{1500}} = \frac{\downarrow -1.40}{\uparrow .83} = -1.69$$

\rightarrow or 169%

* Quantity demanded decreases 1.69 times faster than price rises

$$3.) E = \frac{\frac{155-205}{\frac{205+155}{2}}}{\frac{3.70-2.30}{\frac{2.30+3.70}{2}}} = \frac{\frac{-50}{\frac{360}{2}}}{\frac{1.40}{\frac{6.00}{2}}} = \frac{\frac{-50}{180}}{\frac{1.40}{3.00}} = \frac{\downarrow \downarrow -.28}{\uparrow .47} = -.60$$

\rightarrow or .60 times

* Quantity demanded decreases 60% as fast as price rises

$$4.) E = \frac{\frac{300-30}{\frac{30+300}{2}}}{\frac{9.98-19.95}{\frac{19.95+9.98}{2}}} = \frac{\frac{270}{\frac{330}{2}}}{\frac{-9.97}{\frac{29.93}{2}}} = \frac{\frac{270}{165}}{\frac{-9.97}{14.97}} = \frac{\uparrow 1.64}{\downarrow -.67} = -2.45$$

\rightarrow or 245%

* Quantity demanded increases 2.45 times faster than price falls

$$5.) E = \frac{\frac{13-3}{\frac{3+13}{2}}}{\frac{13.2-12}{\frac{12+13.2}{2}}} = \frac{\frac{10}{\frac{16}{2}}}{\frac{1.2}{\frac{25.2}{2}}} = \frac{\frac{10}{8}}{\frac{1.2}{12.6}} = \frac{\uparrow 1.25}{\uparrow .10} = +12.5$$

\rightarrow or 1250%
 \rightarrow positive E means direct relationship between income and quantity

* Quantity demanded increases 12.5 times faster than income rises

6.) $E = \frac{\downarrow -.02}{\uparrow .01} = -2$ → negative E means an inverse relationship between price and quantity for complimentary goods

* Quantity demanded for erasers decreases 2 times faster than price falls for pencils ↓ or 200%

7.) $E = \frac{\frac{24-60}{\frac{60+24}{2}}}{\frac{600-1800}{\frac{1800+600}{2}}} = \frac{\frac{-36}{\frac{84}{2}}}{\frac{-1200}{\frac{2400}{2}}} = \frac{-36}{42} = \frac{-1200}{1200} = \frac{\downarrow -.86}{\downarrow -1} = +.86$ → positive E means direct relationship between price and quantity

* Quantity supplied decreases 86% as fast as price falls → .86 times

8.) $E = \frac{\frac{14,000-56,000}{\frac{56,000+14,000}{2}}}{\frac{54-102}{\frac{102+54}{2}}} = \frac{\frac{-42,000}{\frac{70,000}{2}}}{\frac{-48}{\frac{156}{2}}} = \frac{-42,000}{35,000} = \frac{\downarrow -1.2}{\downarrow -.62} = +1.94$ → positive E means direct relationship between temp and quantity

* Quantity demanded decreases 1.94 times faster than temp falls → or 194%

9.) $E = \frac{\frac{2-4}{\frac{4+2}{2}}}{\frac{160,000-200,000}{\frac{200,000+160,000}{2}}} = \frac{\frac{-2}{\frac{6}{2}}}{\frac{-40,000}{\frac{360,000}{2}}} = \frac{-2}{3} = \frac{\downarrow -.67}{\downarrow -.22} = +3.05$ → positive E means direct relationship between water and quantity

* Quantity produced decreases 3.05 times faster than water falls → or 305%

10.) $E = \frac{\frac{70-140}{\frac{140+70}{2}}}{\frac{16-8}{\frac{8+16}{2}}} = \frac{\frac{-70}{\frac{210}{2}}}{\frac{8}{\frac{24}{2}}} = \frac{-70}{105} = \frac{\downarrow -.67}{\uparrow .67} = -1$ → negative E means inverse relationship between IQ and TV

* IQ falls at the same rate as TV viewing risers