Section 2.10 Elasticity

1) Write the demand x as a function of the price p and determine the elasticity of demand function $E(p)$ for each of the following functions.

   a) $p = 10 - 0.001x; 0 \le x \le 10{,}000$

   b) $p = -0.05x + 114; 0 \le x \le 2280$

   c) $p = 40 - 0.1x^2; 0 \le x \le 20$

   d) $p = -\frac{3}{50{,}000}x + 59; 0 \le x \le 1{,}000{,}000$

   e) $p = 30e^{-0.05x}; 0 \le x \le 40$

   f) $p = 50 - e^{\frac{x}{20}}; 0 \le x \le 60$

   g) $p = 30 - 15\ln(x+2); 0 \le x \le 5$

   h) $p = 3 - \ln(0.5x + 1); 0 \le x \le 30$

2) Find $E(p)$ for the price-demand equation

$$0.02x + 2p = 80$$

   Find and interpret each of the following:

   a) $E(8)$

   b) $E(30)$

   c) $E(20)$

3) A manufacturer of sunglasses currently sells one type for $21 per pair. The price p and the demand x for these glasses are related by

$$x = 9500 - 250p$$

   If the current price is increased, will the revenue increase or decrease?

4) Consider the price-demand equation for a specialty guitar stool $640 = p + 0.05x$ where p represents the price (in dollars) where x is the number of guitar stools.

   a) Express the demand as a function of the price p.

   b) Find the elasticity of demand, $E(p)$.

   c) For which values of p is demand elastic? Inelastic? For which values of p is revenue increasing as price increases? Decreasing?

5) Given the price-demand function

$$x = 2400 - 6p^2$$

   find the values of p for which demand is elastic and the values for which demand is inelastic. Sketch the revenue function and indicate the regions of inelastic and elastic demand on the graph.

6) Consider the price-demand function

$$p = 30e^{-0.05x}$$

   a) Determine the elasticity of demand when $p = 8$ and the approximate relative change in demand if the price is decreased by 10%. Will the revenue increase or decrease, and why?

   b) Determine the elasticity of demand when $p = 12$ and the approximate relative change in demand if the price is decreased by 10%. Will the revenue increase or decrease, and why?

7) Given the price-demand equation

$$p = -0.04x + 124$$

a) Express the demand x as a function of price p and determine its domain.

b) Find the elasticity of demand $E(p)$.

c) What is the elasticity of demand when $p = \$50$? If this price is increased by 3%, what will be the approximate relative change in demand? Will the revenue increase or decrease?

d) What is the elasticity of demand when $p = \$60$? If this price is decreased by 3%, how much and in what way will the demand change? Will the revenue increase or decrease?

e) What is the elasticity of demand when $p = \$70$? If this price is increased by 3%, what will be the approximate relative change in demand? Will the revenue increase or decrease?

f) What is the elasticity of demand when $p = \$80$? If this price is decreased by 3%, how much and in what way will the demand change? Will the revenue increase or decrease?

g) For which values of p is the demand elastic? What does this mean for revenue in terms of change in price, and why?

h) For which values of p is the demand inelastic? What does this mean for revenue in terms of change in price, and why?