Section 11.5, Applications in Business and Economics

Here we will look at the relationship between raising the cost of a product and the resulting decrease in demand. The **Elasticity of Demand** for a product on an interval is found by dividing the percent change of demand by the percent change in price. So,

$$\eta = -\frac{\text{change in quantity demanded}}{\text{original quantity demanded}} \div \frac{\text{change in price}}{\text{original price}}$$

Rearranging this, we get:

$$\eta = -\frac{\text{original price}}{\text{original quantity demanded}} \div \frac{\text{change in price}}{\text{change in quantity demanded}}$$

We will be looking at the value of the elasticity of demand at a given point (q_A, p_A) instead of on an interval. Taking the interval to length zero in the above equation, we get that:

$$\eta = -\frac{p}{q} \div \frac{dp}{dq}\bigg|_{(q_A,p_A)} = -\frac{p}{q} \cdot \frac{dq}{dp}\bigg|_{(q_A,p_A)}$$

Then, the value η will fall into one of three categories:

1. If $\eta > 1$, the demand is **elastic**, and the percent decrease in demand is greater than the corresponding percent increase in price. If the price increases, revenue will decrease.
2. If $\eta < 1$, the demand is **inelastic**, and the percent decrease in demand is less than the corresponding percent increase in price. If the price increases, revenue will increase.
3. If $\eta = 1$, the demand is **unitary elastic**, and the percent decrease in demand is approximately equal to the corresponding percent increase in price. A change in price will not change the revenue. Revenue is optimized at this point.

Examples
We did #1 and #3 from the book, as well as setting up #9.