**Problem Set**

1. The demand curve for a product is given by \( Q^d_x = 1,000 - 2P_x + 0.02P_z \), where \( P_z = $400 \).

   \( a. \) What is the own price elasticity of demand when \( P_x = $154 \)? Is demand elastic or inelastic at this price? What would happen to the firm's revenue if it decided to charge a price below $154?

   \( b. \) What is the own price elasticity of demand when \( P_x = $354 \)? Is demand elastic or inelastic at this price? What would happen to the firm's revenue if it decided to charge a price above $354?

   \( c. \) What is the cross-price elasticity of demand between good X and good Z when \( P_x = $154 \)? Are goods X and Z substitutes or complements?

2. Suppose the demand function for a firm's product is given by
   \( Q = 200 - 10P_x - 50P_y + 0.01M + 0.4A \) where \( P_x = $10, P_y = $4, M = $20,000, \) and \( A = $250 \).

   \( a. \) Determine the own price elasticity of demand, and state whether demand is elastic, inelastic, or unitary elastic.

   \( b. \) Determine the cross-price elasticity of demand between good X and good Y, and state whether these two goods are substitutes or complements.

   \( c. \) Determine the income elasticity of demand, and state whether good X is a normal or inferior good.

   \( d. \) Determine the own advertising elasticity of demand.

3. Suppose the own price elasticity of demand for good X is -2, its income elasticity is 3, its advertising elasticity is 4, and the cross-price elasticity of demand between it and good Y is -6. Determine how much the consumption of this good will change if:

   \( a. \) The price of good X increases by 5 percent.

   \( b. \) The price of good Y increases by 10 percent.

   \( c. \) Advertising decreases by 2 percent.

   \( d. \) Income falls by 3 percent.

4. (10 Points) Suppose the cross-price elasticity of demand between goods X and Y is -5. How much would the price of good Y have to change in order to increase the consumption of good X by 50 percent?