Problem set 1 – Supply and Demand

1. In each case below, identify the effect on the market for chocolate.

i. An decrease in the price of ice cream
ii. An increase in the population.
iii. A decrease in consumer income.
iv. A decrease in the price of strawberries.
v. An increase in advertising of carob bar companies.

2. Suppose a new discovery in computer manufacturing has just made computer production cheaper. Also, the popularity and usefulness of computers continues to grow. Use Supply and Demand analysis to predict how these shocks will affect equilibrium price and quantity of computers. Is there enough information to determine if market prices will rise or fall? Why?

3. The inverse demand curve for product X is given by:

$$P_x = 25 - 0.005Q + 0.15P_y$$

where P_x represents price in dollars per unit, Q represents rate of sales in pounds per week, and P_y represents selling price of another product Y in dollars per unit. The inverse supply curve of product X is given by:

$$P_x = 5 + 0.004Q$$

a. Determine the equilibrium price and sales of X. Let P_y = $10.
b. Determine whether X and Y are substitutes or complements.

4. The U.S. Department of Agriculture is interested in analyzing the domestic market for corn. The USDA′ s staff economists estimate the following equations for the demand and supply curves:

$$Q_D = 1600 - 125P$$
$$Q_S = 440 + 165P$$

Quantities are measured in millions of bushels; prices are measured in dollars per bushel

a. Calculate the equilibrium price and quantity that will prevail under a completely free market
b. Calculate the price elasticities of supply and demand at the equilibrium values.

c. The government currently has a $4.50 bushel support price in place. What impact will this support price have on the market? Will the government be forced to purchase corn under a program that requires them to buy up any surpluses? If so, how much?

5. American Mining Company is interested in obtaining quick estimates of the supply and demand curves for coal. The firm's research department informs you that the elasticity of supply is approximately 1.7, the elasticity of demand is approximately -0.85, and the current price and quantity are $41 and 1,206, respectively. Price is measured in dollars per ton, quantity the number of tons per week.

a) Estimate linear supply and demand curves at the current price and quantity.
b) What impact would a 10% increase in demand have on the equilibrium price and quantity?
c) If the government refused to let American raise the price when demand increased in (b) above, what shortage is created?

6. Suppose the market for grass seed can be expressed as:

$$Q_D = 100 - 2P$$
$$Q_S = 3P$$

If government imposes a 10% ad valorem tax to be collected from sellers, what is the price consumers will pay? How much tax revenue is collected?

7. The current price charged by a local movie theater is $8 per ticket. The concession stand at the theater averages $5 in revenue for each ticket sold. At the current ticket price, the theater typically sells 300 tickets per showing. If the theater raises ticket prices to $9, the theater will sell 270 tickets. What is the price elasticity of demand at $8? What happens to ticket revenue if the theater increases ticket prices to $9 from $8? What happens to concession revenue if the theater increases ticket prices? If the theater wants to maximize the sum of ticket and concession revenue, should they raise ticket prices to $9?

8. Show that the supply function $Q = 15P^{\eta}$ has constant elasticity.