Problem Set – Chapter 1 Questions

1. Ch 1, Problem 1.2

Suppose the U.S. market for corn is competitive, with an upward-sloping supply curve and a downward-sloping demand curve. For each of the following scenarios, illustrate graphically how the exogenous event will contribute to a higher price of corn in the U.S. market

a. The U.S. Department of Agriculture announces that exports of corn to Taiwan and Japan were “surprisingly bullish,” around 30 percent higher than had been expected.

b. Some analysts project that the size of the U.S corn crop will hit a six-year low because of dry weather.

c. The strengthening of El Nino, the meteorological trend that brings warmer weather to the western coast of South America, reduces corn production outside the United States, thereby increasing foreign countries dependence on the U.S. corn crop.

2. Ch 1, Problem 1.4

A firm produces cellular telephone service using equipment and labor. When it uses $E$ machine-hours of equipment and hires $L$ person-hours of labor, it can provide up to $Q$ units of telephone service. The relationship between $Q$, $E$, and $L$ is as follows:

$Q = \sqrt{EL}$. The firm must always pay $P_E$ for each machine-hour of equipment it uses and $P_L$ for each person-hour of labor it hires. Suppose the production manager is told to produce $Q=200$ units of telephone service and that she wants to choose $E$ and $L$ to minimize costs while achieving that production target.

a. What is the objective function for this problem?

b. What is the constraint?

c. Which of the variables ($Q$, $E$, $L$, $P_E$, $P_L$) are exogenous? Which are endogenous? Explain.

d. Write a statement of the constrained optimization problem.

3. Ch 1, Problem 1.12

Suppose the supply curve for wool is given by

$Q^s = P$,

where $Q^s$ is the quantity offered for sale when the price is $P$. Also suppose the demand curve for wool is given by

$Q^d = 10 - P + I$, 
where $Q'$ is the quantity of wool demanded when the price is $P$ and the level of income is $I$. Assume $I$ is an exogenous variable.

a. Suppose the level of income is $I = 20$. Graph the supply and demand relationships, and indicate the equilibrium levels of price and quantity on your graph.

b. Explain why the market for wool would not be in equilibrium if the price of wool were 18.

c. Explain why the market for wool would not be in equilibrium if the price of wool were 14.