For some years, imports of Chinese-produced tires have had a large and growing presence in the U.S. market, mainly in the “basic tire” segment of the market that includes relatively low price, modest quality tires for cars and light-duty trucks. Recently, President Obama decided to impose a tariff on Chinese tire imports at the rate of 35%. (For more details, see the web link in the Chapter 9 lecture slides.) This problem will examine the welfare effects of the U.S. tariff on Chinese tire imports. The analysis will be based on some simplifying assumptions. The U.S. market is characterized by domestic supply and demand functions that we will describe below. Basic tires are a homogeneous good, with absolutely no difference between the U.S.-produced and the Chinese-produced varieties. Assume that China is the only realistic foreign supplier of basic tires to the U.S market and that Chinese supply is perfectly elastic at a fixed price that we will call the “Chinese price.” With these assumptions, the analysis will basically follow our lecture’s analysis of the effects of a tariff imposed by a “small” country (“Isoland”), even though the U.S. certainly doesn’t qualify as “small.” The “Chinese price” in this problem will play the same role as the “World price” in lecture’s analysis. (Also note that this is basically the same analysis as in the text’s Figure 9-4.)

The domestic demand for basic tires in the U.S. is given by the formula:

$$Q_D = 165.0 - 1.5p$$  for $$p \leq 110.$$  ($Q_D = 0$ for $p > 110$)

where $Q_D$ is quantity demanded in millions of tires per year, and $p$ is the price in $/tire. The domestic (U.S.) supply of basic tires is given by the formula:

$$Q_S = p - 10.0$$ for $$p \geq 10.$$  ($Q_S = 0$ for $p < 10$)

where $Q_S$ is the quantity supplied in millions of tires per year.
a. Graph the domestic supply and demand for basic tires. (To help you get started, you might want to construct a table with one column containing tire prices of $0, $10, $20, . . . $110, and two additional columns giving the quantities domestically supplied and demanded at these prices.) A lot of stuff will be added to this graph later, so make it neat and close to full-page size.

b. Consider the (free-trade) situation prior to the imposition of the tariff. Suppose that the Chinese price is $50/tire. Solve for the quantities of tires that the U.S. will produce, consume, and import from China. Indicate these quantities in your graph from part a.

c. Calculate U.S. consumer and producer surplus (in millions of $/year) in the basic tire market for the free-trade equilibrium. Calculate total welfare (the sum of consumer and producer surplus). Indicate in your graph the areas representing consumer and producer surpluses. (Note that this assignment requires that you indicate the corresponding area in the graph for each welfare measure and that you calculate the numerical value of the area. In this respect, you go beyond what is done in the text's example in Figure 9-4, and also beyond what we did in lecture.)

d. The United Steelworkers Union (which represents workers in a number of tire manufacturing plants in the U.S.) feels that its interests are hurt by the importation of tires from China, so it persuades President Obama to impose a tariff at the rate of 35%, or $17.50/tire, on Chinese imports. With the tariff in place, at what price will basic tires trade in the U.S. market? Solve for the quantities of basic tires that the U.S. will produce, consume, and import. Indicate these quantities in your graph.

e. Calculate U.S. consumer and producer surplus in the basic tire market for the tariff equilibrium. Calculate the U.S. government's tax revenue as a result of the tariff. Indicate in your graph the areas representing consumer and producer surpluses and tax revenue. Calculate total welfare. (Include tax revenue in your calculation of total welfare on the assumption that the government will spend the money on something worthwhile instead of something dumb.)

f. How much are U.S. consumers hurt by the tariff? (Measure this by the change in consumer surplus, before and after the tariff goes into effect.) How much are the owners and employees of U.S. tire manufacturing companies helped by the tariff? (That is, how much does domestic producer surplus increase?) President Obama may have had other, more far-ranging, objectives in mind when he decided to impose the Chinese tire tariff. But, taking into account the tariff’s welfare effects on only the basic tire market, is the tariff a smart policy? Explain.