**Economics 102**
**Spring 2010**
**Home Assignment #2**
**Due2/17/10 at the lecture**

**Directions:** The homework will be collected in a box **before** the lecture. Please place your name, TA name and section number on top of the homework (legibly). Make sure you write your name as it appears on your ID so that you can receive the correct grade. Please remember the section number for the section **you are registered,** because you will need that number when you submit exams and homework. Late homework will not be accepted so make plans ahead of time. **Please show your work.**
Good luck!

**Problem 1**
The following table gives the demand and supply for pairs of winter boots at two different prices. Assume that the demand and supply functions are linear.

| Price | Quantity Demanded | Quantity Supplied |
|-------|-------------------|-------------------|
| 30    | 720               | 90                |
| 120   | 180               | 360               |

(a) Calculate the demand and supply functions for this market.

Use the information in the table to find the equations of the 2 lines.
Demand: $P = (-1/6) Q^d + 150$
Supply: $P = Q^s/3$

(b) Find the equilibrium price and quantity in this market.

Set the demand and supply equations equal to each other to find the equilibrium values.
$(-1/6) Q + 150 = Q/3$
$Q=300$
Plug the equilibrium quantity of 300 into the demand or supply equation to find the equilibrium price.
$P = 300/3 = 100$

(c) The government puts a tax of $5 on each pair of winter boots, requiring producers to give the government $5 for every pair they sell.

   (i) What will the new equilibrium price and quantity be in the boot market once this tax is implemented? Hint: the numbers in this question are not "nice": you may want to use a calculator when doing this set of questions.

   The supply curve shifts leftward as a result of this tax. For every quantity, the price they charge will be $5 higher. The new supply curve is given by
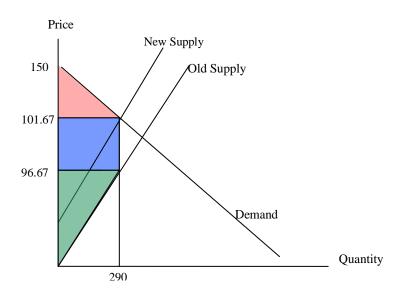
(ii) Calculate consumer and producer surplus and the government's tax revenue as a result of this policy.

(iii) Will the equilibrium price and quantity differ if consumers have to pay the tax to the government instead of the producers?

(d) Because of global warming, the demand of winter boots has dropped 25%. That is, at each price, people want to buy 25% less of the good. Calculate the new demand curve and the new equilibrium (assuming, as in parts (a)-(b), that there is no tax).

*First, calculate the new demand function. We know that for each price, demand has decreased by 25%, so demand equals 3/4ᵗʰ of its original value at each price. To find the new demand function, first solve for the original quantity demanded as a function of price.*
$Q^d = (150 – P)*6$
*The new quantity demanded, $Q^d{}_1$, equals $(3/4)*Q^d$*
$Q^d{}_1 = (3/4) * (150 – P)*6 = 675-9/2* P = 675 – 4.5P$
*To find the equilibrium, set demand equal to supply.*
$675 – 4.5P = 3P → P = 90$
*Then plug this value into the demand or supply equation to get the equilibrium quantity.*
$Q = 3P = 270$

## Problem 2

The table below provides basic information for the market for CD players.
Assume that the demand and supply equations are linear.

TABLE

| Quantity demanded (Units) | Quantity supplied (Units) | Price (US$) |
|---|---|---|
| 440 | 240 | 80 |
| 280 | 280 | 160 |
| 120 | 320 | 240 |

(a) Fill in the missing information in the table above.
   From the table we have two points on the demand curve (280,160) (120,240), we can find the demand function: $P = -(1/2)*Q+300$, then given P=80, we can use demand function to find Q = 440. The other answer is found in similar way.
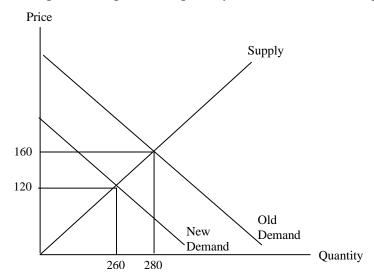
(b) Find the demand and supply equations for this market..

*$Q_d = 600-2P$ or $P_d = 300-1/2Qd$*
*$Q_s = 1/2P+200$ or $P_s = -400+2Qs$*

(c) Find the market equilibrium.

*Set the demand and supply equations equal to each other to find the equilibrium values.*
*$P_e=160$, Qe =280.*

(d) Assume that the development of MP3 players reduces the consumption of CD players by 100 units at each price level. Given this information calculate the new equilibrium price and quantity in the market for CD players.



*The new demand curve will become Qd=500-2Pd, together with the supply curve, we can find the new equilibrium price and quantity. The Demand curve shifts to the left. $P_e=120;Q_e=260$.*
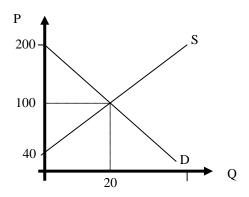
**Problem 3**
In Kaliland, a small closed economy, the supply and demand for boxes of coconuts are given by **D: P + 5Q = 200** and **S: P – 3Q = 40.** The world price of coconuts is $50 per box.

a) Find the equilibrium price and quantity when the economy is closed.

*Rearranging the Supply and Demand equations and setting the equations equal to each other, we have:*
*200 – 5Q = 40 + 3Q, so 160 = 8Q, so Q\* = 20, P\* = 100*

b) Graph the domestic supply and demand curves for coconuts in Kaliland.

c) Now Kaliland opens its coconut market to trade.  Find the quantity of coconuts demanded and supplied domestically.  What is the total quantity of imports in the coconut market?
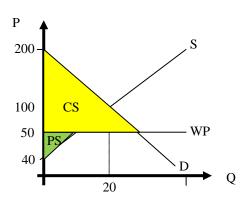
*At World Price (WP) = 50, we can simply plug this price into our D & S curves to find the quantities supplied and demanded domestically. Thus we have:*
*$70 = 200 - 5Q_D$, so $150 = 5Q_D$, so $Q_D = 30$.*
*$70 = 40 + 3Q_S$, so $10 = 3Q_S$, so $Q_S = (10/3)$.*
*Therefore, the total volume of imports is $30 - (10/3) = (80/3)$.*

d) Graph the newly opened economy by adding the world price to the domestic supply and demand curves.  Calculate the total consumer and producer surplus under free trade and label the appropriate areas on the graph.



*Now, we need only find the areas of these triangles to find CS and PS.*
*$CS = (1/2)*150*30 = \$2250$*
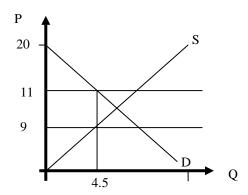*$PS = (1/2)*10*(10/3) = \$(50/3)$*

**Problem 4**
You are given the demand function and the supply function in a particular market:

    Demand: $P = -2*Q+20$

    Supply: $P = 2Q$;

a) Find the equilibrium price P and quantity Q in this market if it is a closed market.
    $P=10, Q=5$.

b) Suppose the government imposes a tax that raises the price of the good in this market by $2. What price will consumers pay for the good? What price will producers receive for the good once they pay the government the $2 per unit tax? How many goods will be sold in the market? Draw and label a graph that clearly depicts this market before and after the imposition of the tax.

The price consumers will pay is $11 per unit of the good purchased, the price producers will receive net of the tax will be $9 per unit of the good sold, and the quantity of the good sold in the market after the imposition of the tax will be 4.5 units.



c) Given the implementation of the tax described in part (b), what is the loss in consumer surplus and the loss in producer surplus with the imposition of this tax compared to the situation that occurs if the economy were a closed economy? Show the areas of consumer and producer surplus on your graph.
When the economy was a closed economy and before the tax was implemented, the consumer surplus was $25 and the producer surplus was $25. After opening the economy to trade and then imposing the tax consumer surplus is equal to $20.50 and producer surplus is equal to $20.50. Thus, the loss in consumer surplus with the imposition of the tax is $4.75 and the loss in producer surplus with the imposition of the tax is $4.75.

d) What is the government revenue from the imposition of this tax?
Tax Revenue = ($2/unit)*(4.5 units) = $9

e) What is the deadweight loss from the imposition of this tax?
Deadweight Loss = (1/2)($11 per unit - $9 per unit)(5 units – 4.5 units) = $0.50

**Problem 5**

You are given the following information about an economy that produces only three final goods: apricots, soy milk, and coffee.

| Year | Apricots | | Soy milk | | Coffee | |
|---|---|---|---|---|---|---|
| | Price | Quantity | Price | Quantity | Price | Quantity |
| 2008 | $2 | 3 | $3.5 | 10 | $1 | 3 |
| 2009 | $4 | 5 | $4 | 15 | $3 | 5 |
| 2010 | $6 | 4 | $4.5 | 20 | $2 | 10 |

a) Compute nominal GDP (NGDP) in 2008, 2009, and 2010.

$NGDP_{2008} = (\$2)(3) + (\$3.5)(10) + (\$1)(3) = \$6 + \$35 + \$3 = \$44$

$NGDP_{2009} = (\$4)(5) + (\$4)(15) + (\$3)(5) = \$20 + \$60 + \$15 = \$95$

$NGDP_{2010} = (\$6)(4) + (\$4.5)(20) + (\$2)(10) = \$24 + \$90 + \$20 = \$134$

b) Compute real GDP (RGDP) in 2008, 2009, and 2010 using 2008 as the base year.

$RGDP_{2008} = (\$2)(3) + (\$3.5)(10) + (\$1)(3) = \$6 + \$35 + \$3 = \$44$

$RGDP_{2009} = (\$2)(5) + (\$3.5)(15) + (\$1)(5) = \$10 + \$52.5 + \$5 = \$67.5$

$RGDP_{2010} = (\$2)(4) + (\$3.5)(20) + (\$1)(10) = \$8 + \$70 + \$10 = \$88$

c) With 2008 as the base year, what is the GDP deflator for 2008, 2009, and 2010?

$$\text{GDP deflator}_{2008} = \frac{NGDP_{2008}}{RGDP_{2008}}(100) = \frac{\$44}{\$44}(100) = 100$$

$$\text{GDP deflator}_{2009} = \frac{NGDP_{2009}}{RGDP_{2009}}(100) = \frac{\$95}{\$67.5}(100) = 141$$

$$\text{GDP deflator}_{2010} = \frac{NGDP_{2010}}{RGDP_{2010}}(100) = \frac{\$134}{\$88}(100) = 152$$

d) Assume that apricots are purchased by households, coffee is exported abroad, and soy milk is acquired by the government in a purchasing program. Provided that investment and imports are equal to zero from 2008 – 2010, complete the following table.

| Year | Consumption (C) | Government expenditure (G) | Net exports (NX) |
|---|---|---|---|
| 2008 | | | |
| 2009 | | | |
| 2010 | | | |

| Year | Consumption (C) | Government expenditure (G) | Net exports (NX) |
|------|-----------------|---------------------------|------------------|
| 2008 | $6 | $35 | $3 |
| 2009 | $20 | $60 | $15 |
| 2010 | $24 | $90 | $20 |