Boston College
Problem Set 3, Fall 2012
EC 131 - Principles of Microeconomics
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> Answer the questions in the spaces provided on the question sheets. If you run out of room for an answer, continue on the back of the page. Be succinct. Longer answers don't increase your chance of being right, but increase your chance of saying something wrong. **Show how you got your answers in mathematical questions**

Name: _____

1. Say whether the propositions are True or False. If they are False, justify.

   (a) Demand is more price-elastic in the long-run

   > **Solution: True**.

   (b) If price-elasticity of demand is always 1, an increase in 1% in price leads to a 1% increase in revenue

   > **Solution: False**. If price-elasticity of demand is 1, changes in price don't affect revenue.

   (c) Minimum wage policies lead to unemployment.

   > **Solution: False**. Minimum wage policies only have effect on employment if it is binding. That is, it will only generate unemployment if equilibrium wage is lower than the minimum wage chosen.

2. Consider the following pairs of goods. For which of the two goods would you expect the demand to be more price elastic? Why?

   (a) water or diamonds

   > **Solution:** Diamonds are luxuries, and water is a necessity. Therefore, diamonds have the more elastic demand.

   (b) insulin or nasal decongestant spray

   > **Solution:** Insulin has no close substitutes, but decongestant spray does. Therefore, nasal decongestant spray has the more elastic demand.

   (c) food in general or breakfast cereal

   > **Solution:** Breakfast cereal has more substitutes than does food in general. Therefore, breakfast cereal has the more elastic demand.

   (d) gasoline over the course of a week or gasoline over the course of a year

   > **Solution:** The longer the time period, the more elastic demand is. Therefore, gasoline over the course of a year has the more elastic demand.

   (e) personal computers or Acer personal computers

   > **Solution:** There are more substitutes for IBM personal computers than there are for personal computers. Therefore, IBM personal computers have the more elastic demand.

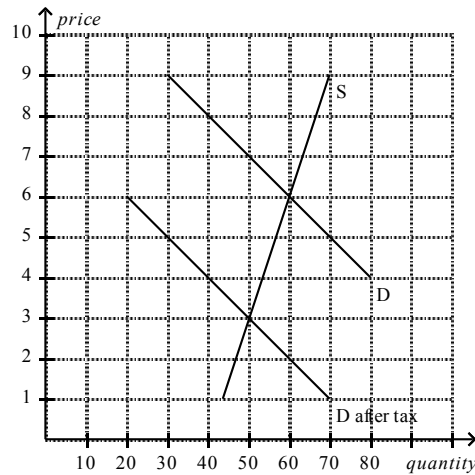3. With the aid of the graph shown, answer the following questions.

Figure 1: Taxes and market equilibrium

(a) What was the equilibrium price in this market before the tax?

Solution: $ 6

(b) What is the amount of the tax?

Solution: $ 4

(c) How much of the tax will the buyers pay?

Solution: $ 1

(d) How much of the tax will the sellers pay?

Solution: $ 3

(e) How much will the buyer pay for the product after the tax is imposed?

Solution: $ 7

(f) How much will the seller receive after the tax is imposed?

Solution: $ 3

(g) As a result of the tax, what has happened to the level of market activity?

> **Solution:** As a result of the tax, the level of market activity has fallen, from 60 units bought and sold to 50 units bought and sold.

4. Consider the market for rice. Let the supply curve be given by the equation (quantities are tons of rice):

$$Q_s = 2P$$

and demand be:

$$Q_d = 500 - 3P$$

(a) Find the market equilibrium price P^* and quantity Q^*

Solution:

In market equilibrium, $Q_d = Q_s$. Thus:

$$500 - 3P = 2P$$

Thus:

$$500 = 5P$$

Solving for P^*:

$$P^* = 100$$

Using the supply curve, we can find the equilibrium quantity:

$$Q^* = 2P^* = 200$$

Suppose now that the government sets a **price floor for rice of \$120 per ton of rice**.

(b) What are the quantity demanded and the quantity supplied with the price floor? What is the excess demand (or excess supply) in this economy?

Solution:

Since the equilibrium price is \$100, the price floor of \$120 is binding. We should expect, thus, to be an excess supply in the economy.

At $P = 120$, the demand for rice is:

$$Q_d = 500 - 3 = 140$$

That is, 140 tons. The supply is:

$$Q_s = 2 \times 120 = 240$$

That is, 240 tons. There is, thus an excess supply of 100 tons of rice.

(c) Draw a graph showing the demand and supply curves, clearly indicating the intercepts, its values and the market equilibrium. Trace a line at the price floor value. Indicate the quantity demanded, quantity supplied and excess demand (or excess supply).

Solution:

5. Take the same market in question 4 (without price controls) and suppose that the government starts taxing the sale of rice at the rate of $20 per ton sold, to be paid by the seller.

(a) Find the tax equilibrium (that is, the quantity sold Q^T and the prices paid by the consumers (P_c^*) and by the sellers (P_s^*).

> **Solution:**
>
> Since the tax value is $20, the price received by the seller can be expressed as:
>
> $$P^s = P^c - 20$$
>
> The demand and supply equations are in terms of each own's prices:
>
> $$Q_s = 2P^s$$
> $$Q_d = 500 - 3P^c$$
>
> Replacing P^s:
>
> $$Q_s = 2(P^c - 20) = 2P^c - 40$$
> $$Q_d = 500 - 3P^c$$
>
> Equating demand and supply:
>
> $$Q_s = Q_d \implies 2P^c - 40 = 500 - 3P^c \implies 5P^c = 540 \implies$$
> $$\implies P_c^* = \frac{540}{5} = 108$$
>
> Since $P^s = P^c - 20$:
>
> $$P_s^* = P_c^* - 20 = 108 - 20 = 88$$
>
> To find Q^T we can use the demand or the supply equations, being careful with using the **correct price**:
>
> $$Q^T = 2P_s^* = 2 \times 88 = 176$$

(b) Which part of the market will pay the bigger share of the tax burden? The consumers or the sellers? Justify.

> **Solution:**
>
> Without taxes, equilibrium price is $P^* = 100$. With taxes, $P_s^* = 88$ and $P_c^* = 108$. The suppliers burden per unit is $P^* - P_s^* = 12$, while the consumers' burden is $P_c^* - P^* = 8$. Thus, **sellers will pay a bigger share of the tax burden**.

(c) Base only on your answer for the last question, what can you say about the relative elasticities of supply and demand for the rice market?

> **Solution:**
>
> Since the sellers pay a bigger share of the tax burden, the rice supply is **more inelastic**, relative to the demand.