Boston College
Problem Set 4, 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) If the government imposes a binding price floor in the market, then the consumer surplus in that market will increase

   > **Solution:** False. It will decrease, since the price will be higher than the one that prevails in the absence of the price floor.

   (b) Connie can clean windows in large office buildings at a cost of $1 per window. The market price for window-cleaning services is $3 per window. If Connie cleans 100 windows, her producer surplus is $100.

   > **Solution:** False. Her producer surplus is of $2 per window. Thus, her total producer surplus is of $200.

   (c) A tax on insulin is likely to cause a very large deadweight loss to society.

   > **Solution:** False. The demand for insulin is highly inelastic. The deadweight loss is, thus, comparatively small.

2. The only four consumers in a market have the following willigness to pay for a good:

| Buyer | WTP |
|---|---|
| Carlos | $15 |
| Quilana | $25 |
| Wilbur | $40 |
| Ming-la | $45 |

(a) Draw the market demand curve. **Clearly label all relevant values**.

> **Solution:**

(b) Suppose that the market price is $30. What is the total consumer surplus? How is it distributed among the consumers?

> **Solution:** Total consumer surplus is:
>
> $$CS = (45 - 30) + (40 - 30) = \$25$$
>
> Wilbur obtains $10 of surplus, while Ming-la obtains $15.

3. Suppose that the market for green tea can be described by the following demand and supply curves (prices are per lb):

$$Q_d = 260 - 5P$$

$$Q_s = 8P$$

(a) Find the market equilibrium ($P^*$ and $Q^*$) in the absence of taxes. Draw the demand and supply curves, labeling all intercepts and the market equilibrium.

> **Solution:**
> Market equilibrium:
>
> $$Q_d = Q_s$$
>
> $$260 - 5P = 8P \implies 13P = 260 \implies P^* = 20$$
>
> Plugging $P^*$ in the supply curve:
>
> $$Q^* = 8 \times 20 = 160$$

(b) Draw the curves as in the last item, showing clearly the areas representing the consumer surplus (CS) and the producer surplus (PS). Calculate their values and the value of the total surplus (TS).

> **Solution:**
> Consumer surplus:
>
> $$CS = \frac{(52 - 20) \times 160}{2} = \$2,560$$
>
> Producer surplus:
>
> $$PS = \frac{20 \times 160}{2} = \$1,600$$
>
> Total surplus:
>
> $$TS = CS + PS = \$4,160$$

(c) Suppose now that the goverment decides to tax green tea by \$13 per lb. Calculate the tax equilibrium (that is, the values of $P^c$, $P^s$ and $Q^T$).

**Solution:** The tax equilibrium can be found by solving the following for equilibrium:

$$Q_d = 260 - 5P^c$$

$$Q_s = 8P^s$$

$$P^c = P^s + 13$$

Set $Q_d = Q_s$:

$$260 - 5P^c = 8P^s$$

Replace $P^c$:

$$260 - 5(P^s + 13) = 8P^s \implies 195 = 13P^s \implies P^s = 15$$

Thus:

$$P^c = 28$$

$$Q^T = 8 \times 15 = 120$$

(d) Draw the demand and supply curves again (with all their intercepts), indicating which areas correspond to consumer surplus (CS), producer surplus (PS), tax revenue (TAXR) and deadweight loss (DWL) for the tax equilibrium you derived in the last item

**Solution:**

(e) Calculate the values of CS,PS,TAXR and DWL from the last item.

**Solution:**

$$TAXR = t \times Q^T = 13 \times 120 = \$1,560$$

$$CS = \frac{(52 - 28) \times 120}{2} = \$1,440$$

$$PS = \frac{15 \times 120}{2} = \$900$$

To find the DWL, we can either calculate the are of the triangle:

$$DWL = \frac{13 \times (160 - 120)}{2} = \$260$$

Or by comparing with total surplus without tax:

$$DWL = 4160 - 1560 - 1440 - 900 = \$260$$

End of problem set.