Economics 204  
Problem Set 9: Equilibrium

1. Demand and supply for grapefruit are given by the following equations.

\[ Q_d = 20 - 2P_d \]
\[ Q_s = -1 + P_s \]

(a) Compute the equilibrium price and quantity that characterize this market. Draw a graph, labeling price intercepts and other points of interest.

(b) Compute the elasticity of demand at \((P^*;Q^*)\).

(c) Suppose the Grapefruits Are Good Association (GAGA) lobbies successfully for a $3 subsidy on the market for grapefruit. Compute the new equilibrium quantity, price for suppliers and price for demanders. Illustrate the changes on a new graph.

(d) Compute consumer surplus and producer surplus in the market after the subsidy.

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(e) How much taxpayer money went to subsidizing the industry?

(f) Is there a deadweight loss? If so, compute DWL and label it on the graph from (c).

2. Now suppose instead of a subsidy, the supply of Grapefruit is restricted to a quantity of 4.

(a) Graph the market for Grapefruit under this condition.

(b) Show the effect on consumer surplus, producer surplus, and deadweight loss using the graph and table below.

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3. Suppose the demand curve for workers is \( P_D = 125 - \frac{1}{4} Q_D \)
   The supply function for workers is \( P_s = \frac{1}{6} Q_s + 10 \)
   Graph the above functions.

   What is the equilibrium price and the equilibrium traded quantity in the labor market?

   At this equilibrium, what is total economic surplus, producer surplus and consumer surplus? (Same homework question as last time!)

4. Now suppose a $5 tax per worker is introduced. Compute the new market equilibrium prices and traded quantity, the new levels of producer and consumer surplus, tax revenues, and the deadweight loss. Why has the level of economic surplus declined as a result of the tax?

   Here are some old exam questions on demand and supply so you can practice with more multiple choice questions. For each, draw a diagram indicating the effects on the price, quantity, consumer surplus, producer surplus, government revenue (if relevant) and the deadweight loss (if any).

5. The government decides that in order to limit dependence on foreign oil, gasoline prices will be set at $4 per gallon. Which of the following are likely outcomes of that policy? (More than one may be possible.)
   
   a. Long lines at the pump.
   
   b. Drivers bribe store owners to get gas.
   
   c. Gas stations begin offering free car washes along with a gas purchase.
d. Gas stations begin offering gas only to frequent customers or personal friends of the owner.

e. None of these are likely effects.

6. Suppose we observe that the price of cocaine has been falling, even though the amount of cocaine traded (illegally) has also been falling. Possible explanations for this include

a. The law of demand does not hold because cocaine is illegal

b. Other illegal drugs have become more popular with users

c. The supply of cocaine has been restricted due to major arrest of a Columbian drug lord

d. The price of other illegal drugs has recently spiked.

e. None of the above: the price should not fall if sales are down.

7. Which of the following are potential results of a price floor for wages? (Indicate all correct answers.)

a. Shortages in the labor market, with firms engaging in costly search activities and head-hunting.

b. Unemployment in the labor market, with potential workers competing engaging in costly search activities.

c. Firm discrimination on the basis of characteristics like personal connections or appearance.

d. A deadweight loss.

e. A reduction in consumer surplus

f. An increase in consumer surplus