

**UNIVERSITY OF WISCONSIN**  
**Economics 101 – Spring 2007**  
**Professor Brown**  
**Problem Set 6 Answers**

1.
  - a.  $Q+5=50-2Q \Rightarrow 3Q=45 \Rightarrow Q=15$   
 $P=15+5=20$
  - b. Demand's y-intercept is 50. Consumer Surplus =  $(50-20)*15*(1/2)=225$   
 Supply's y-intercept is 5. Producer Surplus =  $(20-5)*15*(1/2)=112.5$
  - c. Demand is  $10=50-2Q \Rightarrow Q=20$   
 Supply is  $10=Q+5 \Rightarrow 5$   
 Thus the new quantity traded in the market is 5.  
 There is no excess supply, but there is an excess demand of  $20-5=15$ .
  - d. Producer Surplus =  $(10-5)*5*(1/2)=12.5$
  - e. Less snow blowers are being purchased.
  - f. The area that need to be calculated is a trapezoid. Length of one side is  $50-10=40$ .  
 Length of the other side is  $(50-2*5)-10=30$ . The width is 5. Thus, the consumer surplus is  $(30+40)*5*(1/2)=175$ .  
 Deadweight-Loss =  $30*10*(1/2)=150$ .  
 Note that the original total surplus is  $225+112.5=337.5$ , the current total surplus and deadweight-loss is  $12.5+175+150=337.5$
  - g. If there is no mechanism, then consumer surplus will be lower and deadweight-loss will be higher. There is no answer to the exact consumer surplus or deadweight-loss without further information. For example, if a consumer that values the product the least are assigned the good first, then the consumer surplus will be 25 and deadweight-loss will be 200.
  - h. The new supply curve becomes  $P-15=Q+5 \Rightarrow P=Q+20$ . The equilibrium is  $Q+20=50-2Q \Rightarrow 3Q=30 \Rightarrow Q=10$ .  $P=10+20=30$ .
  - i. The price is 30 and 15 is tax, so producers receive 15 for each unit.
  - j. Tax revenue =  $15*10=150$
  - k. The price increase is  $30-20=10$ . Thus consumers pay 10 and producers pay 5.
  - l. Consumer surplus is  $(50-30)*10*(1/2)=100$ . Producer surplus is  $(15-5)*10*(1/2)=50$ . Deadweight-loss is  $15*(15-10)*(1/2)=37.5$ .  
 Note that tax revenue + total surplus + deadweight-loss = 337.5.
  - m. Consumers will pay more.
  - n. Producers will pay more.
2.
  - a.  $100-Q=Q \Rightarrow Q=50 \Rightarrow P=50$ .
  - b. Tax buyers:  $P+10=100-Q \Rightarrow P=90-Q$ .  $90-Q=Q \Rightarrow Q=45$ .  $P_{\text{buyers}}=Q=45$ ;  
 $P_{\text{buyers}}=P_{\text{sellors}}+10=55$ . Tax revenue is  $45*10=450$ .
  - c. Tax revenue is given as  $Q*T$ . Quantity is the solution to the equilibrium problem,  $100-T-Q=Q$ . Thus,  $Q=(100-T)/2$ . Finally tax revenue is  $50T-(T^2)/2$ . Clearly as tax increases, tax revenue first increases then decreases. There is a tax level such that tax revenue is

maximized.

