Problem Set # 3
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1. Consider a market described by the demand curve P = 100 - 5Q, and the supply curve P = 15Q.

   a) Graph the supply and demand curve for this market.
   b) Calculate the equilibrium price P* and the equilibrium quantity Q*, and identify these on your graph.
   c) Suppose the government imposes a sales tax of T = 20 on each unit sold in this market. Graphically show how this affects the market. Why does the sales tax shift the supply curve up (vertically) by the amount of the tax (i.e., the new supply curve is P = 15Q + T = 15Q + 20)?
   d) Calculate the new equilibrium price P* and quantity Q* after the tax is introduced, and identify these on your graph.
   e) Is it true that the after tax equilibrium price is equal to the original equilibrium price plus the tax? If not, explain why not.
   f) Calculate the tax revenue received by the government.
   g) How much of the tax is paid for by consumers, and how much is paid for by producers?
   h) What is the consumer surplus and producer surplus before the tax is imposed?
   i) What is the consumer surplus and producer surplus after the tax is imposed?
   j) What is the dead weight loss to society due to this tax?

2. Now consider a market that has the same tax imposed and supply curve as question 2 above, but the demand curve is P = 100 - Q.

   a) What is the market equilibrium before and after the tax? Show graphically on one graph.
   b) What is the consumer surplus and producer surplus before and after the tax?
   c) What is the deadweight loss due to the tax?

3. Now consider a market that has the same tax imposed and supply curve as questions 1 & 2 above, but the demand curve is P = 50.

   a) What is the market equilibrium before and after the tax? Show graphically on one graph.
   b) What is the consumer surplus and producer surplus before and after the tax?
   c) What is the deadweight loss due to the tax?
   d) So who bears the tax burden in this instance? Can you explain intuitively why this is so? What if the demand curve, rather than being a horizontal line, as it is here, were a vertical line?

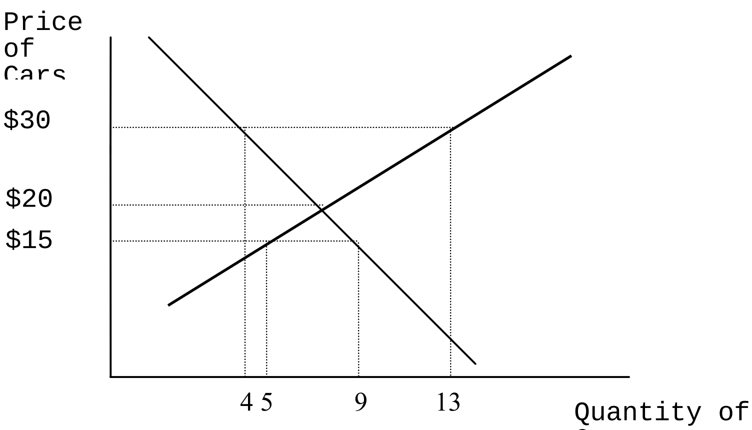
4. Now consider a market that has the same supply and demand curve as problem #1, but now the tax is imposed on the buyer instead of the seller. Graph this market before and after the tax is imposed.

   a) What is the demand curve after the tax is imposed?
   b) What is the new equilibrium?
   c) What is the tax revenue raised by the government?
   d) What portion of the tax is paid for by consumers versus producers?
   e) What is the consumer surplus and producer surplus before the tax is imposed?
   f) What is the consumer surplus and producer surplus after the tax is imposed?
   g) Compare your answers to question 1.

5. Assume the demand curve for a 16” pizza in Athens is P = 50 - 4Q, and the supply curve is P = Q.

   a) Graph the market for 16” pizza in Athens.
   b) What is the market equilibrium (i.e., equilibrium price and quantity)
   c) Suppose the Athens City Council is concerned that the equilibrium price of pizza is too high and passes a law that prohibits anyone from selling a 16” pizza for more than $2. Show on your graph what happens to the pizza market.
   d) What is the new price and quantity sold of 16” pizzas in Athens?
   e) What is the consumer surplus and producer surplus before the price ceiling is imposed?
   f) What is the consumer surplus and producer surplus after the price ceiling is imposed?
   g) What is the dead weight loss to society due to this price ceiling?
   h) What if, rather than the price ceiling, the City Council decided it would assist pizzerias by imposing a $18price *floor*. What is the new price and quantity sold?
   i) What is the producer and consumer surplus after the imposition of the floor?

6. Consider the following market for Cars (prices in thousands):



(a) Label the Demand and Supply Curves, and the Market Equilibrium.
(b) State the Law of Demand. What does it imply about the demand curve?
(c) Distinguish the difference between a change in demand and a change in quantity demanded.
(d) Which of the following is true when the price of each car is $30,000 (if the answer is (i) or (ii), how much is the excess)?
  (i) The quantity demanded exceeds the quantity supplied.
  (ii) The quantity supplied exceeds the quantity demanded.
  (iii) The quantity supplied equals the quantity demanded and therefore, the market is in equilibrium.
(e) Which of the following is true when the price of each car is $20,000 (if the answer is (i) or (ii), how much is the excess)?
  (i) The quantity demanded exceeds the quantity supplied.
  (ii) The quantity supplied exceeds the quantity demanded.
  (iii) The quantity supplied equals the quantity demanded and therefore, the market is in equilibrium.
(f) Which of the following is true when the price of each car is $15,000 (if the answer is (i) or (ii), how much is the excess)?
  (i) The quantity demanded exceeds the quantity supplied.
  (ii) The quantity supplied exceeds the quantity demanded.
  (iii) The quantity supplied equals the quantity demanded and therefore, the market is in equilibrium.
(g) What does the supply curve represent?
(h) Distinguish between an individual firm’s supply curve and the market supply curve for cars. Similarly, distinguish between an individual’s demand curve and the market demand curve for cars.

(i) Show graphically how each of the following affects the price and quantity of cars sold:

   (i) Price of steel increases
   (ii) Consumers' income increases
   (iii) Fares for public transportation double
   (iv) Price of gasoline increases
   (v) Government imposes a lump sum tax on car producers
   (vi) Government imposes a price ceiling on cars