

**14.01, 2007 Fall**  
**Problem Set 1**  
**Due: September 14th**

1. Please write your name, the name of your TA, and your section/recitation time (e.g. MWF 10am, or F 1 pm) on top of your solutions.
2. Problem sets are due IN SECTION/RECITATION. Late Problem sets will not be accepted under any circumstances.

**Questions:**

1. For each of the following scenarios, use a supply and demand diagram to illustrate the effect of the given shock on the equilibrium price and quantity in the specified competitive market. Explain whether there is a shift in the demand curve, the supply curve, or neither.
  - (a) (8 points) The MBTA decides to increase the price of a T-token from \$ 1.25 to \$ 1.70, and also increases the price of monthly T-passes. Show the effect on demand, supply and on the equilibrium in the greater Boston area market for used cars. Are T-passes and cars substitutes or complements?
  - (b) (8 points) America is the biggest producer of corn in the world. Bad weather conditions in the Midwest lead to a very low production of corn in the USA. Show the effect on the world corn market.
  - (c) (8 points) The US government has introduced a price cap on steel a couple of years ago. The excess demand for steel has resulted in many complaints by lobbying groups in Washington, and to please these, the government raises the price cap on steel from \$100/ton to \$125/ton. This is however still below the free market price of \$150/ton. Show the effect on the market for steel.
  - (d) (8 points) US steel mills buy their coal in Latin America. Show the effect of the above mentioned policy (in (c)) on the Latin American coal market.
  - (e) (8 points) The popularity of a new fad diet causes consumers' tastes to shift away from bread. Show the effect on the market for butter, which is used mainly when people eat toast.

2. Consider the market for butter. The demand curve is given by

$$Q_d = 300 - 2 \times P + 4 \times I,$$

where  $I$  is the average income. The supply curve is

$$Q_s = 3P - 25 \times P^M - 25,$$

where  $P^M$  is the price of milk.

- (a) (10 points) If the average income in Cambridge is  $I = 25$  and the price of milk is  $P^M = 1$ , what is the market clearing price and quantity in Cambridge?
  - (b) (10 points) Suppose that bad weather conditions raise the price of milk to  $P^M = 2$ . Find the new equilibrium price and quantity of butter in Cambridge. (Draw a graph to illustrate your answer).
  - (c) (10 points) If the average income in Beverly Hills is  $I = 50$ , what is the market clearing price and quantity in Beverly Hills when  $P^M = 1$ ? Compare your results with the ones you have obtained in (a).
3. Suppose the market demand and market supply for apartments in a city are given by the following functions:

$$Q_d = 5000 - 3p$$

$$Q_s = 1000 + p.$$

- (a) (10 points) At what price does the market for apartments in the city clear? How many apartments are rented at this price?
- (b) (10 points) Suppose the city sets a maximum rent at \$1200. Illustrate the rent control in a supply and demand diagram. Is there a shortage? If so, what is the excess demand?
- (c) (10 points) Suppose that there is a binding rent control law. What must be true of the maximum rent imposed by the city for it to be binding? Will there be an excess demand or supply of apartments at this price? Further, suppose that in response to the rent control law, some (but not all) landlords decide to convert their apartments to condominiums, which are not subject to rent control. What will the effect on the rental market for apartments be? Show using a diagram.