Problem Set #1
Due September 17, 1997

1. a) Graph demand curves for the following consumers. Be sure to label them with numbers to indicate important points on the graphs, including the intercepts and any kinks.

   i) Consumer A whose demand is given by $Q = 10 - 2P$.

   ii) Consumer B whose willingness to pay is given by $P = 7 - 0.25Q$.

   iii) Consumer C who is willing to spend a total of $T = 16Q - 2Q^2$, where Q is the quantity bought.

   iv) Consumer D who is willing to pay $6 for one unit, $4 for a second unit, $1 for a third, and won't buy a fourth at any price.

   v) Consumer E who will pay no more than $2 per unit of the good, will buy up to 4 units at that price, and will buy no more than 4 units at any price.

   vi) Consumer F who will spend $12 on whatever amount of the good that will buy, regardless of price.

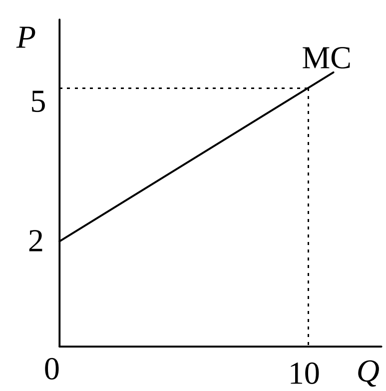
   b) Graph the market demand curves for markets composed only of the following consumers from part (a):

   i) Consumers A and B

   ii) Consumers A, C, and E.

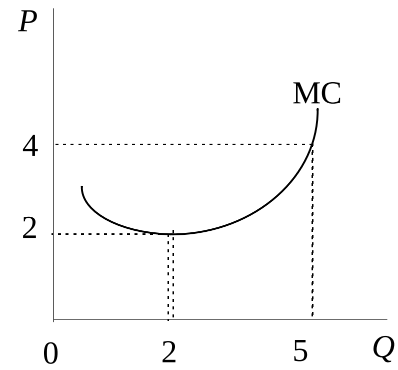
2. Draw the market supply curves of the following industries, all of whom you may assume behave competitively.

   a) 10 firms each with marginal cost curves as drawn:



b) 100 firms each with marginal cost $MC = 3 + Q$.

c) 2 firms each with the marginal cost curve drawn:



d) 4 firms, numbered i=1,2,3,4, with marginal costs $MC_i = i + 12Q / i$.

e) 5 firms with constant marginal cost, MC = 6, plus 5 other firms with marginal cost $MC_2 = 8 + 0.001Q$.

3. Four firms each have constant but different marginal costs as shown in the following table. They also have capacity constraints that prevent them from producing more than the maximum amount indicated. Government, the only demander in this industry, wants 24 units of the good.

Firm	**MC**	**Capacity**
A	4	8
B	8	6
C	2	10
D	6	12

a) If each firm charges a price equal to its own marginal cost, how much will the government spend if it buys an equal number of units from each firm?

b) Under the pricing assumption of part (a), could the government save money by buying different amounts from the different firms? Why? How?

c) Graph the supply and demand curves for this market and find the competitive market equilibrium price.

d) How much does the government spend in the market equilibrium you just found, and how much does it buy from each firm? How does this outcome compare to the others that you have looked at above?

4. The following are (inverse) supply and demand equations for a good, the production of which generates an external diseconomy, E, that is constant per unit of output.

$$P = -4 + 3Q$$

$$P = 10 - 0.5Q$$

$$E = 7$$

a) Find the market equilibrium price and quantity in the absence of government intervention.

b) What is the socially optimal level of output in this industry? By what proportion is it smaller than the free market output in part (a)?

c) Starting from the equilibrium of part (a), if a tax is used to move output to the optimal level, who gains, who loses, and by how much? What was the excess burden of the externality?

d) Discuss the pros and cons of moving to the optimal output without a tax, instead simply directing all firms to reduce output by the proportion you found in part (b).