Introductory Microeconomics
Homework 4: Partial Equilibrium

Javier Tasso

1. T/F. If demand is perfectly inelastic, then the equilibrium price is entirely determined by demand.
2. T/F. With free entry, the supply curve is perfectly elastic in the long run.
3. T/F. The market for insulin is likely to have an inelastic demand.
4. T/F. If two goods are substitutes, an increase in the price of one will decrease the demand for the other.
5. T/F. In a perfectly competitive market the sum of producer and consumer surplus is maximum.
6. Consider the market of a good. Supply and demand are given below.

$$Q_S(p) = p - 4 \qquad Q_D(p) = 100 - 3p$$

   (a) Plot them. Find the equilibrium price and quantity. Calculate the consumer surplus and the producer surplus. Calculate the total surplus.

   (b) Suppose demand shifts to $Q'_D(p) = 120 - 3p$. Find the new equilibrium price and quantity. What could have generated this shift?

   (c) Suppose instead. $Q'_S(p) = p - 12$. Repeat the previous question.

7. In an imaginary market all firms have the following cost structure. Let q be the individual quantity each firm produces, and Q the aggregate market quantity. First we focus on the individual firms.

q	MC	AVC	ATC
0	$\times$	$\times$	$\times$
1	5.5	5.75	25
2	5	5.5	15
3	4.5	5.25	12
4	4	5.1	10
5	5	5	9
6	6	5.1	8.4
7	7	5.25	8.1
8	8	5.5	8
9	9	5.75	8.05
10	10	6	8.2
11	11	6.5	8.5
12	12	7	8.75

(a) Plot MC, AVC and ATC in the same graph. What's the efficient scale? What's the price that would prevail in the long run?

(b) In the short run, the individual supply of a firm is $q_S(p) = p$ if $p \geq 5$ and zero otherwise. Intuitively explain why.

Now we focus on the market. Suppose initially market demand is $Q_D(p) = 120 - 5p$.

(c) Find the long run equilibrium price p^* and aggregate quantity Q^*. In this long run equilibrium the number of firms is 10. Explain why.

(d) In the short run, the aggregate supply in this market is $Q_S(p) = 10p$ if $p \geq 5$ and zero otherwise. Explain why.

(e) Plot the market demand and supply (both in the short and long run).

Now demand shifts to $Q_D(p) = 150 - 5p$

(f) Find the short run equilibrium price and aggregate quantity. Are firms making a profit or a loss in this market? Will there be firm entry or exit?

(g) Find the long run equilibrium price and aggregate quantity after firm entry (or firm exit).

(h) Illustrate the changes in your graph. Your plot should include the initial long run equilibrium, the intermediate short run equilibrium, and the final long run equilibrium after the firm entry/exit.

8. Consider two similar markets. Demand is the same, but in the first one supply is perfectly inelastic and in teh second one it is perfectly elastic.

$$\begin{aligned} &\text{Market 1: } Q_D(p) = 10 - p \qquad Q_S(p) = 5 \\ &\text{Market 2: } Q_D(p) = 10 - p \qquad p = 5 \end{aligned}$$

(a) Calculate the equilibrium prices and quantities in both markets. Calculate the consumer surplus in both markets.

Now there's a change in both markets. Demand shifts to $Q'_D(p) = 12 - p$.

(b) Calculate the new equilibrium in both markets.

(c) Calculate the new consumer surplus in both markets. Can you explain the differences?

9. Two consumers have the following individual demands:

$$q_{D1}(p) = \begin{cases} 6 - p & \text{if} \quad p \leq 6 \\ 0 & \text{if} \quad p > 6 \end{cases} \qquad q_{D2}(p) = \begin{cases} 4 - p & \text{if} \quad p \leq 4 \\ 0 & \text{if} \quad p > 4 \end{cases}$$

(a) Plot them in two separate plots.

(b) Complete the following table to calculate the aggregate demand. $Q = q_1 + q_2$ is the aggregate demand.

p	q_1	q_2	Q
0			
1			
2			
3			
4			
5			
6			

(c) Plot the aggregate demand.

10. In an imaginary market all firms have the following cost structure. Note this cost structure is the same as the one in problem #9 of Homework 3. In this exercise we use q for individual quantities produced by each firm and Q for the total quantities in the market.

$$\mathrm{TC} = 50 + \frac{1}{2}q^2 \qquad \mathrm{MC} = q$$

(a) What's the efficient scale of the firms? What's the price that will prevail in the long run?

(b) $Q_D(p) = 900 - 10p$ is the market demand. Plot demand and (long run) supply. Now answer: (i) What's the equilibrium price and aggregate quantity in the market?, (ii) How many firms are there in this market?, and (iii) How many units does each firm produce?

(c) Repeat (b) for $Q_D(p) = 500 - 10p$. Was there firm entry of firm exit? Explain why.