

Econ 101A
Midterm 2

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Th April 5, 2012

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You have approximately 1 hour and 20 minutes to answer the questions in the midterm. We will collect the exams at 11.00 sharp. Show your work, and good luck!

Problem 1. Demand, Supply, and Taxes. (55 points). Assume the case of perfect competition, with each firm i producing quantity q_i with total cost $C_i(q_i) = cq_i$. That is, costs are linear in the quantity produced.

1. Determine the marginal cost function C'_q and the average cost function $C(q)/q$, and plot the two functions in a graph with x-axis quantity q_i and y-axis cost/price. (5 points)
2. Plot graphically the supply function for each firm. Also, write it analytically, in the form $q^* = S(p)$, that is, what the quantity supplied q^* is as a function of p . (5 points)
3. Assume now that in perfect competition there are 5 firms, all with the same cost function $C_i(q_i) = cq_i$. How does the aggregate supply function differ from the individual supply function, if at all? Plot, and write analytically. (5 points)
4. Assume now that aggregate demand is given by the linear (inverse) demand function $p(Q) = A - bQ$, with $A > c$. Draw in the graph with the marginal cost function of point (3). If you want, assume $A = 10$, $c = 5$, $b = 1$. Solve (graphically or otherwise) for the equilibrium perfect competition price p_{PC}^* , as well as for the overall quantity produced Q^* , and obtain also analytical solutions. Notice that the equilibrium will be where demand equates supply. How do quantity and price depend on A and c ? (5 points)
5. Highlight graphically the consumer surplus and compute the area in term of the parameters c , A , and b . (To do so, remember how to compute the area of a triangle) How does the consumer surplus depend on c and on A ? Comment (5 points)
6. Highlight graphically the producer surplus and compute the area in term of the parameters c , A , and b . How does the producer surplus depend on c and on A ? Comment (5 points)
7. Suppose now that a tax of amount t is imposed in this perfectly competitive market, so that the price that consumers pay is p' , but producers only earn $p' - t$. Assume $t < A - c$. Show graphically the new equilibrium price p'^* and quantity Q'^* , and solve analytically for these variables. (5 points)
8. Discuss in light of the answer to the previous question what the incidence of the tax is in this case (that is, who bears the burden of the tax), and interpret in light of what we discussed in class about elasticities. (5 points)
9. Highlight graphically the new consumer and producer surplus. (5 points)
10. Highlight graphically, and then compute analytically, the deadweight loss due to taxation. (5 points)
11. In light of your previous answer, discuss this statement: ‘Taxes generate a deadweight loss which is a linear function of the tax rate’. Is this correct? (5 points)

Problem 2. Insurance. (30 points)

Tim drives a Toyota and expects to find himself in an accident within the next year with probability p , with $0 \leq p \leq 1$. If an accident occurs, the damage amounts to loss L ; there is no damage if no accident occurs. Tim's utility over wealth is $u(w) = \ln(w)$, and Tim starts the year with wealth w_0 . Tim chooses how much (if any) of an insurance policy to buy. The policy is as follows. Tim pays premium q per each dollar paid to him in the event of an accident. He chooses how many dollar of insurance α to purchase, with $0 \leq \alpha \leq L$. (To be clear, α is the number of dollars that the insurer will reimburse if an accident occurs) (The set-up hence is as in class, except that we specified the form of the utility function)

1. Write down the expected utility of Tim. (5 points)
2. Maximize the expected utility with respect to α and derive the first-order conditions. (5 points)
3. Without worrying for now about the boundary conditions ($0 \leq \alpha \leq L$), solve for α^* [If you get stuck here, move to next point and use your intuition] (10 points)
4. What is the solution for α^* in the case $p = q$? How much insurance does the agent purchase? Comment and provide intuition. [If you could not solve the point above, write what you expect to find, and why] (5 points)
5. What is qualitative feature of the solution for α^* in the case $p < q$? How much insurance does the agent purchase? Comment and provide intuition. [If you could not solve the point above, write what you expect to find, and why] (5 points)