Econ 101A
Midterm 2

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Th 10 April 2008

Do not turn page unless instructed to.

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

Problem 1. Manager with Expected Utility (25 points)**.** A manager decides how much effort e to put in managing a company. We assume $e \in [0,1]$. The effort determines the probability of success, and hence the manager's pay. With probability e, a project succeeds and the manager gets paid $W > 0$. With probability $1-e$, the project fails and the manager is fired (and hence is paid 0). The manager has initial wealth w and utility over consumption $U(c)$, with $U'(c) > 0$ for all c. The manager consumes all the income, including the initial wealth, after she is paid the salary (possibly zero). The cost of effort is $-e^2/2$.

1. Write the expected utility maximization of the manager with respect to e. (5 points)
2. Write the first order condition and derive the solution e^*. (5 points)
3. What is the effect of an increase in salary W on the optimal effort e^*? Interpret the intuition. (5 points)
4. What is the effect of an increase in the initial wealth w on the optimal effort e^*? Interpret the intuition, relating to what you know about attitude toward risk. (10 points)

Problem 2. Profit Maximization with Taxes (96 points) We consider the market for widgets, which is characterized by the aggregate (inverse) demand function $p(X) = a - bX$, where X is the total quantity of widgets demanded in the market. The cost function of each company is $c(y) = cy^{\alpha}$, with $c > 0$.

1. Assume perfect competition (that is, the price p of the widget is given) and set up the profit maximization of each firm. (5 points)
2. Solve for the profit-maximizing level of production $y^*(p)$ (that is, the supply function) using the first-order condition. (5 points)
3. Check the second-order conditions. Under what values of the parameters are they satisfied? Interpret the economic significance of this parameter restriction. (5 points)
4. Now consider the conditions for the market equilibrium. For points 4-7, assume that the parameters are such that the second order conditions are satisfied. Assume that N firms produce and write the equation for the equilibrium price p^* that equates aggregate supply and demand. Do not attempt to solve explicitly for p^*. (5 points)
5. Now introduce taxation. Denote by p the price inclusive of tax that the consumer pays, and by $p - t$ the price net of tax that accrues to the producer. Rewrite the market equilibrium condition. (5 points) [Note: If you get stuck here, you can move on to point 8]
6. Use the implicit function theorem to compute $\partial p^*/\partial t$. (5 points)
7. Show that $0 < \partial p^*/\partial t < 1$. What does it mean economically? (5 points)
8. From now on, consider the case $\alpha = 1$. Assume for now no taxes ($t = 0$). What is the economic interpretation of this special case? (5 points)
9. Characterize mathematically the supply function $y^*(p)$ for an individual company, and plot it. (5 points)
10. Solve for the market equilibrium price p^* and total quantity X^* produced in the market, assuming no taxes. [Note: A figure may help you here] (5 points)

11. Compute the aggregate consumer surplus and the producer surplus. You can help yourself with a plot of market demand and supply. [Note: Do not worry here about the distinction between compensated and uncompensated demand] (5 points)

12. Solve now for the market equilibrium price p^* and total quantity X^* produced in the market assuming a tax t. How much of the tax do the companies pass through in prices (that is, what is $\partial p^*/\partial t$)? (5 points)

13. Compute the consumer surplus and the producer surplus for the case with a tax t. (5 points)

14. Compute the total surplus adding the consumer surplus, the producer surplus, and the revenue raised with the taxes. (5 points)

15. Using what you just found, argue that the deadweight loss from taxation is given by $t^2/2b$. Do you agree or disagree with the following statement? Provide a precise argument: 'Small taxes are not very distortionary, but large taxes can induce very large deadweight loss' (8 points)

16. Consider now the case of monopoly. Keep assuming $\alpha = 1$ and a tax t. [Note: As above, the price p denotes the price that consumers pay inclusive of taxes, and $p - t$ is the price that producers receive] Set-up the maximization problem and solve for the profit-maximizing price p_M^* and quantity X_M^*. (8 points)

17. How much of the tax does the firm pass through to the consumer (that is, what is $\partial p^*/\partial t$)? Compare to the case of perfect competition for $\alpha = 1$. (5 points)

18. Compute the producer surplus and the consumer surplus and compare to the case of perfect competition for $\alpha = 1$. (5 points)