**Due: October 21, 2004**

# Midterm Exam
# Due: October 21st, 2004

**You *may* discuss the principles involved in answering the questions, and work out similar questions from other texts or that you have made up with anyone, including other members of the class. You *may not* show your answers or draft answers to these questions to anyone, or look at anyone else's answers or draft answers to these questions. You must write and submit your own answers.**

**If for any reason you fear you cannot turn in the examination on time, you *must* contact Markus Schneider or Duncan Foley *before* the due date and inform either of us of the problem.**

Write out your answers clearly in full sentences, explaining briefly the principles involved and showing the methods by which you reach your conclusions. Write each answer on a separate sheet of paper, clearly labeled with your name, the course number, the problem set number, and the problem number.

Part A – Answer every part of the following four problems.

1. Complete parts a) thru d) for each of the following utility functions:

$$i)\ u[x_1, x_2] = \min[ax_1, bx_2]$$
$$ii)\ u[x_1, x_2] = x_1^{0.25} x_2^{0.75}$$
$$iii)\ u[x_1, x_2] = 4\ln(x_1) + x_2$$
$$iv)\ u[x_1, x_2] = x_1 + x_2$$

a) Graph the indifference curves represented by each utility function. On your graph, be sure to show the maximum utility consumption point using an arbitrary budget constraint (assume that P > 1 for *iv*). What type of utility function does each expression represent? (30%)
b) For ii) through iv), find the marginal rate of substitution for each utility function as a function of the consumption bundle ($x_1$, $x_2$). Why does it not make sense to ask for the marginal rate of substitution of i)? (30%)
c) Given the budget constraint, $Px_1 + x_2 = Pm_1 + m_2$, find an expression of the demand for good 1 in terms of the endowment and the price for each utility function. Graph the different demand functions for good 1. (20%)
d) Graph the Engel curve for good 1 for each utility function. (20%)

2. The consumers in a market for a good ($x_1$) all have the following utility function:

$$u(x_1, x_2) = \sqrt{x_1 x_2}$$

Good 2 ($x_2$) is generalized purchasing power expressed in terms of \$. The price, P, is the price of the good in terms of \$. Assume that consumers are price takers.
a) Using the consumers' utility function, find the representative consumer's demand for good 1 ($x_1$) as a function of price and income using the Lagrangian. (20%)

**Due: October 21, 2004**

b) Suppliers are willing to supply the good at a constant supply price, P = $2.50. If each consumer has $m_2$ = $10 ($m_1$ = 0), find the consumption bundle, $\{x_1, x_2\}$, each consumer chooses. (20%)
c) What would be the new consumption bundle if the consumers' endowment doubles ($m_2$ = $20)? (20%)
d) Show the consumer choice model described above graphically. Be sure to show the consumption bundle before and after the endowment change. (10%)
e) If there are 1000 identical consumers in the market for good 1, analyze the endowment change as a comparative statics experiment in a supply-demand model for good 1. Be sure to include a supply-demand graph with your answer, and label on it any shifting curves. (30%)

3. Take the market for a single good summarized by the demand and supply functions below, and answer the following questions.

$$X^D = -2P + 16$$

$$X^S = 4P - 2$$

a) Calculate the competitive equilibrium consumption level and price, and the consumer and supplier surplus. (30%)
b) If a 25% tax is imposed on this market, how much does the consumer surplus shrink? How much does the supplier surplus shrink? (30%)
c) Calculate the tax revenue generated by the tax, and the deadweight burden incurred. (20%)
d) Is this a competitive outcome? Is it a Pareto-optimal allocation? (20%)

4. Imagine the market for credit cards, where banks have statistical information about two types of applicants: good and bad. Good applicants are willing to pay an interest rate of 15% and never default on their debt, while bad applicants are willing to pay 20% but 40% of them will default. Assume that there are more banks offering credit cards than there are applicants, so that banks must accept the weighted average return given the proportion of good credit card applicants in the market (think of Akerlof's lemons model).
a) Find the pricing equation that tells banks how much of a return (actual interest rate) they can expect given the proportion of good applicants, $\pi$. Graph the actual interest rate versus the proportion of good applicants. (40%)
b) If banks only offer credit cards if they can expect a return of 13.5%, what proportion of applicant must be good for the banks to offer credit cards? (30%)
c) If bad applicants defaulted only 20% of the time, would good applicants apply for credit cards? Explain and be sure to explain whether the outcome is Pareto-optimal? (30%)

**Due: October 21, 2004**

Part B – Choose **one** of the following topics and write a short (less than 750 words) essay. Be sure to indicate which topic you are addressing.

1. On the basis of your general knowledge, choose two industries, one for which you think the assumption of competition is appropriate and one where you think the assumption of competition is inappropriate. Explain the aspects of each industry that are relevant to the choice of an economic model, and what might go wrong in an analysis if an economist applied the competitive model to the wrong industry.

2. Explain under what conditions competitive markets may not reach a Pareto-optimal allocation. Use two industries to exemplify two different types of market failure, and discuss the relevance and importance - or irrelevance and lack of importance - of Pareto-optimality to social welfare.