# Department of Agricultural & Applied Economics
# Microeconomics Qualifying Exam

May 25, 2012
9:30 a.m. to 2:30 p.m.

Your **810 Code #** .

Please provide complete answers to all questions. You have 5 hours to complete the exam; allocate your time accordingly. Number your responses to the questions clearly and write your answers legibly and orderly. Illegible writing may cause your answers to not be correctly credited. It is essential that you state all assumptions clearly and demonstrate your command of economic reasoning.

1. Consider a pure exchange economy with two goods $(x, y)$ and two people (1,2) where the total endowment of each good is $e_{x,1} + e_{x,2} = \bar{e}_x = 12$ and $e_{y,1} + e_{y,2} = \bar{e}_y = 12$. Assume preferences are given by: $U_1(x_1, y_1) = x_1 + y_1$ and $U_2(x_2, y_2) = 2\ln(x_2) + \ln(y_2)$.

   **a)** Assuming initial endowments of $e_{x,1} = 3$, $e_{x,2} = 9$, $e_{y,1} = 9$, $e_{y,2} = 3$, solve for the Walrasian equilibrium.

   **b)** For this economy find the set of Pareto efficient allocations. Illustrate precisely the set of Pareto efficient allocations on a graph. Discuss which (and how) Pareto efficient allocations in this economy can be supported as a competitive equilibrium.

   **c)** Consider the social welfare function, $W(U_1(x_1, y_1), U_2(x_2, y_2)) = \min\ \{x_1, x_2, y_1, y_2\}$. Solve for the commodity allocations that will maximize social welfare. Given the specification of preferences, is this allocation Pareto efficient? Explain why this social welfare function is economically not the most sensible.

2. Academic journals, such as the *American Journal of Agricultural Economics*, charge different subscription rates to institutions (college libraries, etc.), individual academics, and students. Explain this in terms of the theory of price discrimination. What would you predict about the pattern of relative subscription rates across these subscriber groups? Some journals are owned by profit-maximizing firms (publishing companies) and others are owned by learned societies (with contracted publication). What difference, if any, would you expect this to make to (a) the level of their rates, and (b) the pattern of price discrimination? (Use graphical analysis and/or mathematical illustration to support your written discussion in detail.)

3. A producer of widgets in a perfectly competitive market has estimated the following variable cost function for its output, y:

$VC = y^3 - 8y^2 + 24y$

Fixed costs of production are \$8.

a. Set up the profit maximization problem for this firm.

b. Derive the supply function for this firm. (**Hint:** You will need to use the average variable cost function to derive the complete supply function.)

c. Graph the supply function. Show both the average variable cost curve and the marginal cost curve. Be sure to label the axes of your graph.

d. Evaluate **graphically** and **mathematically** the impact of a tax $\tau$ that is imposed on each unit of output. Graph the changes in the total cost, marginal cost and average cost curves. Indicate the new equilibrium price, $p_\tau$, and quantity, $q_\tau$.

e. Now consider a generic cost function C(q,w,r), where q is output, w is the wage rate, and r is the capital rental rate. State the properties of the cost function and briefly discuss each property.

4. Three individuals, *A*, *B*, and *C* have decided to buy land for a public park they will share between the three of them in the nature of a public good denoted by *Z*. The inverse demand functions for the three individuals are:

$P_A = 20 - Z$
$P_B = 30 - Z$
$P_C = 40 - Z$

a. With $MC = 78$ for this public good, determine the Pareto-Efficient level of *Z*.
b. At the Pareto-Efficient level of *Z*, how much should each individual pay for their new park (e.g., what are the associated Lindahl prices)?
c. From a theoretical perspective, why would you expect the Lindahl prices to be different for each individual?