Department of Agricultural & Applied Economics
Microeconomics Qualifying Exam

May 28, 2010
10:00 a.m. - 3:00 p.m.

Your 810 Code #_____

Please provide complete answers to all questions. You have **5** hours to complete the exam, so you should allocate your time accordingly. Number your answers clearly to correspond to each question. It is very important to write your answers **legibly**. Illegible writings may cause your answers not being correctly credited.

1. Describe briefly why economic efficiency (Pareto Efficiency) is a necessary condition for maximizing social welfare. State the three necessary conditions for economic efficiency (Pareto Efficiency) using mathematical equations and provide an economic interpretation of these equations (that is, explain what these equations mean).

2. Suppose a consumer's preferences are described by an indirect utility function, $v(p, y)$, where p is a vector of prices for goods and services that the consumer consumed, and $y > 0$ is the consumer's total income or budget available for purchasing the goods and services in the market.

a. Explain in words how you can use v to derive (i) the consumer's (Marshallian) demand functions, (ii) his/her expenditure function, (iii) his/her Hicksian demand functions.

b. Suppose that the consumer's indirect utility function is given by

$$v(p,y) = \frac{y}{2}\frac{1}{\sqrt{p_1 p_2}}.$$

Using the procedure you outlined in a, derive the following:

(i) The (Marshallian) demand functions.

(ii) The expenditure function.

(iii) The Hicksian demand functions.

c. Discuss the concept of duality and explain how important and useful this concept is in the theory of demand. For example, illustrate how you might derive the Hicksian demand functions, if you are given a utility function such as, $u(q_1, q_2) = \sqrt{q_1 q_2}$.

3. Assume that you know the cost function:

$$c(r, w, Q) = 1.96013 * Q * r^{\frac{2}{5}} * w^{\frac{3}{5}},$$

where Q is output, r is the price of capital (K) and w is the price of labor (L).

a. Derive the production function Q (K, L). What technology is associated with this cost function?

b. Will the long-run profit function be well defined for this technology? Why or why not?

4. Two graduate students, Joe and Harry, found themselves locked in Conner Hall over the two-week winter holiday break with no way to get out of the building and no way to phone or email for help since a severe winter storm has knocked out all communications to the building. Joe and Harry, intending to survive for at least the two-week break discover that there are 200 units of food, Q (bags of chips, peanuts, etc.) in the Conner Hall vending machine. The utility functions for Joe and Harry are:

Joe: $U_J = Q_J^{1/2}$

Harry: $U_H = 1/2 Q_H^{1/2}$

Where, $Q_J + Q_H = 200$

a. If the 200 food units are allocated equally between Joe and Harry, how much utility will each receive?

b. How should the 200 food units be allocated between Joe and Harry to assure equality of utility?

c. Assume Joe and Harry develop the social welfare function: $SW = Q_J^2 Q_H$. How will the 200 units of food now be allocated to maximize social welfare?

5. A single firm has a total monopoly in the production of flims. Its long-run total cost and demand curves are given by the following equations:

$LTC = 6.9Q + .003Q^2$ and $P = 12.65 - .022Q$,

where total cost is expressed in thousands of dollars per annum, Q is annual output, expressed in thousands of flims, and P is the price per flim expressed in dollars.

a. Calculate the annual output, the price, and the firm's pure profit, when pure profit is maximized.

b. The government is considering the imposition of an *ad valorem* sales tax on flims of 10% of the price (net of tax). The government also wishes to consider alternative policies of a per-unit excise tax on flims, or an annual license fee on the firm, at such rates as to yield the same tax revenue as the proposed *ad valorem* tax.

(i) Calculate the output, prices, and pure profit (net of tax) for each of the three options, on the assumption that the firm would in each case maximize its pure profit net of tax.

(ii) Compare the impact of the taxes on the firm and on consumers. Which tax would you recommend and why?