Department of Agricultural & Applied Economics
Microeconomics Qualifying Exam
Jun 2, 2016
10:00 a.m. to 3:00 p.m.

Your **810 Code #** _____

Please provide complete answers to all questions. You have 5 hours to complete the exam; allocate your time accordingly. Please follow all instructions listed below:

- Number your responses to the questions clearly.
- Write the last 4 digits of your Student ID number at the top right of each response page.
- Write the page number in the lower right hand corner of each response page.
- Write your answers legibly and orderly. Illegible writing may cause your answers to not be correctly credited.
- Write only on one side of paper with a blue or black pen.
- Clearly box all final answers to numerical and algebraic problems

(1.1) Consider preferences represented by the utility function $U(x_1, x_2) = \ln(x_1) + 4\ln(x_2)$ facing market prices $p_1, p_2 > 0$. Let the consumer's wealth be denoted by $I > 0$. Setup a Lagrangian for maximizing utility subject to the budget constraint and solve for the Marshallian (uncompensated) demand functions for x_1 and x_2.

(1.2) How do you interpret the Lagrange multiplier in the utility maximization problem?

(1.3) Find the Indirect Utility function. State and demonstrate three properties of the Indirect Uility function.

(1.4) Find the consumer's Expenditure function in the simplest way possible.

(1.5) State and demonstrate three properties of the Expenditure function.

(1.6) Derive the Hicksian (compensated) demand functions for x_1 and x_2.

(2.1) Consider a pure exchange economy with 2 people (A and B) and 2 commodities denoted x_1 and x_2. The preferences of individuals A, and B are represented as:

$$U^A(x_1^A, x_2^A) = x_1^A + 2x_2^A \qquad\qquad U^B(x_1^B, x_2^B) = \min\{2x_1^B, x_2^B\}$$

where $\delta > 1$. Solve for the competitive equilibrium of this economy assuming initial endowments are:

$$e_1^A = 10, e_2^A = 10, \qquad e_1^B = 10, e_2^B = 10,.$$

You do not have to show any work, but you must box the following (a) the setup of all optimization problems, (b) the demand functions for each agent, and (c) the final answer for the Walrasian Equilibrium. Clearly and precisely illustrate the equilibrium, initial endowment, core of the economy, and the set of Pareto Efficient Allocations

(2.2) Consider an economy consisting of a single consumer and a single firm that is owned by the consumer. The consumer is endowed with zero units of the consumption good and has 24 units of time. The consumer's time is divisible and may be allocated towards leisure activities or labor employed by the firm. The consumer's preferences are represented by the following utility function $u(\ell, x_2) = \ell^{2/3} x_2^{1/3}$ where ℓ denotes the time consumer allocates to leisure and x_2 is the consumption good. The firm produces the output good using labor according to the following production technology: $f(L) = 2L$. Negative consumption of goods or leisure is not permitted in this economy. Letting p and w denote, respectively, the price of the consumption good and the wage rate, solve for the competitive equilibrium for this economy (in your answer, normalize the price of the consumption good to 1). It is recommended that you clearly setup any relevant optimization problems, express and box relevant derived supply and demand functions in addition to boxing your final equilibrium solution.

(3.1) Suppose that you are a teaching assistant for a freshman microeconomics course that involves no calculus. A student comes to office hours and does not understand why the market equilibrium (in the absence of market failures) is efficient. Nor does the student understand why market power (e.g., monopoly and oligopoly) sometimes leads to inefficient market outcomes and sometimes leads to efficient market outcomes despite the existence of market power. Using graphs and language appropriate for a freshman student, help answer the student's question (2 pages MAX).

(3.2) Suppose that you are a teaching assistant for an intermediate undergraduate microeconomics course. A student studying duopolies comes to your office and is confused about the difference between Bertrand, Cournot, and Stackelberg models. Briefly (1 paragraph max) explain the three models.

(3.3) Consider a duopoly setting where the linear demand and cost functions are:
$$p = 14 - (q_1 + q_2)$$

$$c(q_j) = 2q_j + 5, j = 1,2$$

Derive the Cournot model equilibrium, Stackelberg model equilibrium, and the equilibrium under collusion.

(4.1) What are the pure strategy Nash equilibria in the following discrete-strategy-space game? Calculate the probabilities necessary for the mixed strategy Nash Equilibrium. Be sure to explicitly state which probabilities are used by which players.

Lennon \ McCartney	Compose Songs	Record Songs
Compose Songs	4, 4	2, 3
Record Songs	2, 1	3, 5

(4.2) AT&T is considering entering the Athens cellular phone market. Currently, Verizon wireless is the only firm providing cellular phone service in Athens. If AT&T enters, there could be a price war. If AT&T stays out, Verizon earns monopoly profits of $10 million and AT&T earns zero. If AT&T enters, it will incur an irreversible entry cost of $2 million. If there is a price war, each firm will earn $1 million. Verizon has the option of "accommodating entry" (i.e., not starting a price war). In this case, both firms would earn $4 million. The timing of this market is as follows: first, AT&T has to choose whether or not to enter the market. Then Verizon decides whether to "accommodate entry" or "engage in a price war". Illustrate this game in extensive form. Solve for the subgame perfect equilibrium.