MICROECONOMICS COMPREHENSIVE EXAMINIATION
Binghamton University
February 18, 2011

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Please answer all questions

PART A

1. (Khanna) Why is it necessary for people to stand in line for days before the sale of tickets to concerts by famous performers? Design a market based mechanism that would eliminate the waiting-in-line phenomenon but at the same time ensure that the concerts are always sold out. Explain how your mechanism would work.

2. (M. Jones) Competitive firms prefer uncertain prices to the average of the uncertain prices True/False/Uncertain? Justify.

3. (M. Jones) When the preference relation over goods is not continuous, a utility function may not exist. True/False/Uncertain? Justify.

4. (Pape) There are two goods, X and Y, and two agents, A and B. Suppose in any Walrasian equilibrium in which both A and B each consume both X and Y, the allocation of X between A and B always the same. Find preferences for A and B that result in such a state of affairs. (You may find using an Edgeworth box helpful.)

5. (Pape) Claim: the set Nash equilibrium strategy profiles is contained within the set of strategy profiles which survive Iterated Elimination of Dominated Strategies. True/False/Uncertain? Justify.

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PART B

6. (M. Jones) A risk averse individual incurs a loss of L if an accident occurs. The accident occurs with probability P. The individual has an initial wealth W_0. Prove: if insurance is actuarially fair, then the individual will choose full insurance.

7. (M. Jones) Let $v(p, y)$ be a consumer's indirect utility function where p stands for prices and y income. Prove: $v(p, y)$ is quasiconvex.

8. (Khanna) A firm uses two inputs, capital, K and labor, L, to produce output, Q. The inputs are purchased in a perfectly competitive market at prices r and w, respectively, where both r and w are strictly positive. Suppose you use firm level data to empirically estimate the firm's cost function and find that it can be approximated by:

$$C(Q, r, w) = \frac{rwQ^2}{r + a^2 w}$$

where $a > 0$ is a parameter.

(a) Can this be a reasonable economic representation of the firm's cost function? That is, does the function above satisfy all the basic properties of a cost function? If not, show which property is violated.

(b) Now suppose that the equation above is indeed the firm's cost function. Derive the firm's condition demand functions for capital and labor.

(c) Suppose that the firm sells its output in a perfectly competitive product market at price, p. Derive the firm's supply function and its profit function as a function of p, r, w, and a.

9. (Khanna) Consider a consumer with the following utility function,

$$U(x, z \,|\bar{z}) = x^{\alpha}(z + \bar{z})^{1-\alpha}$$

where *x* is a numeraire good, and *z* is a privately purchased public good with price = *P*, and 1 > α > 0 is a preference parameter. $\bar{z}$ is the publicly provided quantity of the good and whose quantity is exogenously determined. (An example of such a good is air quality where $\bar{z}$ is the background level of air quality that is determined by environmental regulation and *z* is private contribution to air quality by the individual, say through the purchase of a hybrid car.)

(a) Derive the demand functions for the two private goods, *x* and *z*, for this individual.

(b) Show that depending on the level of the consumer's income, it is possible that the consumer will not purchase a positive quantity of z.

(c) Now suppose that the local laws change so that $\bar{z}$ increases. How will the consumer's demand for the two private goods, *x* and *z*, change? Consider both possible types of consumers, one that buys *z* at price *P* and one that does not purchase any positive quantity of *z* at price *P*.

(d) Support your answer in part (c) with an intuitive explanation.

10. (Pape) State whether each of these claims about Walrasian Equilibrium in an economy with N agents, J firms, and L goods are Always True, Not Always True, or Never True, and justify your claim.

a) The Marginal Rates of Substitution between any two goods are the same for any two agents.

b) Firms make a profit of zero.

c) All markets clear.

d) L prices are uniquely determined.

e) All prices are positive.

11. (Pape) There are nine Lions circling one Sheep. Each Lion in turn can choose whether to EAT the sheep or PASS. (The Lions keep going around in a circle.) If the Lion EATs the sheep, he turns into a sheep (at which point there would be 8 Lions circling one Sheep, etc.) All Lions have the following preferences:

    "Eating a sheep and not getting eaten"

    is better than

    "Not eating a sheep"

    is better than

    "Eating a sheep but getting eaten"

    What is the SPNE of this, the nine-Lion game? CAREFULLY EXPLAIN.

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PART C

1. (M. Jones) State and prove the Slutsky equation.

2. (M. Jones) Let $A = \{a_1, \cdots, a_n\}$ be the set of outcomes. Let *G* be the set of gambles over A. Assume that an individual's preferences over *G* satisfy the axioms of completeness, transitivity, continuity, monotonicity, substitution and reduction to simple gambles. Prove that the following "independence axiom" is satisfied: for any three gambles g^0, g^1 and $g^2 \in G$, if $g^0 \gtrsim g^1$, then $\lambda g^0 + (1-\lambda)g^2 \gtrsim \lambda g^1 + (1-\lambda)g^2$ for any $\lambda \in [0,1]$. Interpret this result.

3. (Pape) A friend of yours is living in an apartment building. Suppose that there are N residents. The superintendent of the apartment building is considering buying a piece of art for the lobby. The piece of art will cost each resident of the apartment building 100 dollars (for a total cost of 100N). The superintendent of the building is not sure if it's worthwhile to buy this art.

   Suppose each resident i = 1, … N each has some value $\theta_i \geq 0$ attached to the art.

   (a) The superintendent polls the residents about whether they would be willing to pay 100 dollars for the art. He found that around sixty percent of the residents think it's a good idea, so he takes that as evidence that it is a good idea. What is the problem with his logic? (In your answer, consider offering a counterexample.)

   The superintendent now tries the following policy:

   1. Let each agent submit a value m_i, which will be interpreted as their own value, in dollars, for the artwork.
   2. If the artwork is installed, then each agent i pays an amount equal to the sum of all other m. If this sum is positive, agent i receives that amount of money; if it is negative, agent i pays it. If the artwork is not installed, agents get paid nothing.
   3. When the superintendent as received all ms from residents, he makes buys the artwork if the average m is greater than $100.

   (b) Is this a mechanism in which truth-telling is a dominant strategy? Show that it is or it isn't.

   (c) Will this mechanism generate enough money to cover the cost of the artwork, if it is installed?

4. (Pape) Consider an economy with three goods: x, y, and z . There are 100 identical agents with utility

$u(x_i , y_i , z_i)$ and endowment ω_i :

$u(x_i , y_i , z_i) = \alpha \ln(x) + \beta \ln(y), \alpha, \beta > 0, \alpha + \beta = 1$

$\omega_i = (0, 0, 1)$

There are two firms. Firm 1 is owned by agent 1 and produces x and firm 2 is owned by agent 2 and produces y. Both take z as an input. The production functions are:

$X = f_1 (z_1) = k z_1, \quad 0 < k < 1$

$Y = f_2 (z_2) = z_2$

where X and Y are the total amounts of X and Y in the economy.

(a) Find the Walrasian equilibrium of this economy.

(b) Who is made better off and who worse off by a marginal increase in k? Explain.

Suppose that y is replaced with public good Y which is produced by the same production function (equation 5) and enters each utility function (equation 2) in the same way.

(c) What is the private level of Y supplied in the modified economy? Who is made better off and who worse off by the y to Y replacement, assuming the private outcome? Explain.

(d) What is the optimal level of Y in this economy? Assuming that optimal Y is achieved via a Lindahl equilbrium, who is made better or worse off by the y to Y replacement? Explain.