ECONOMICS 113 --- FINAL EXAMINATION

This examination is take-home, open book, open notes. Feel free to consult any published reference you wish. Cite references if you need to use their results in answering a question. State clearly any additional assumptions you need. If your answer includes a quotation or paraphrase of a passage in Starr's *General Equilibrium Theory*, please restate the passage in your own words.

All examinations are open‑book, open‑notes. There is no time limit other than the due date. Confidentiality is required during examinations. Please strictly observe academic integrity. Examinations should be your own personal work. During examinations, other people (classmates, friends, professors --- except Troy and Prof. Starr) are CLOSED; do not discuss examination materials until after the exam has been collected. If you have questions, e-mail them to Prof. Starr at rstarr@ucsd.edu.

THIS EXAM IS DUE BY 2:30 PM, FRIDAY JUNE 12, 2009. TURN IN HARD COPY OF YOUR EXAM TO SYDNEY SPRUNG, THE RECEPTIONIST IN ROOM 245 SEQUOYAH, OR E-MAIL TO Troy Kravitz troykravitz@gmail.com .

Answer any **FOUR (4)** questions you like. All count equally.

Answer **ONLY FOUR (4)** questions. Additional answers will be ignored.

GOOD LUCK!!

1. The proof of the First Fundamental Theorem of Welfare Economics (Starr's *General Equilibrium Theory*, Theorem 12.1) uses the weak monotonicity assumption (C.IV).   The theorem is invalid (that is, the conclusion may not be true) without the assumption. Note that non-monotone (locally satiated) preferences will be characterized by thick indifference curves (zones of satiation).   Recall take-home midterm, question 3.

   Explain how C.IV is used in the proof of Theorem 12.1 of Starr's *General Equilibrium Theory*. Where does the logic of the proof of the theorem break down without C.IV?   [Hint: It is not sufficient to give an example where the equilibrium allocation is not Pareto efficient. That is question 3 from the take-home midterm. This question asks you to look at the proof to see how C.IV is used, and to identify which essential step(s) cannot be taken in the absence of C.IV.]

2. The usual textbook model of intermediate microeconomics includes a U-shaped cost curve for the typical firm. A U-shaped (marginal) cost curve shows that firm costs (and input requirements) per unit output start high at low levels of output and decline, before eventually rising again as output levels increase. Diminishing marginal cost is typical of a scale economy. Thus the U-shaped cost curve model embodies a small scale economy at low levels of operation.

   A natural monopoly is a firm whose technology includes large scale economies, diminishing marginal cost throughout the range of production. Its production function might be $y = f(x) = x^2$ (where y is output, x is input and the function is x squared) . The technology set will be non-convex.

   Note that under both the U-shaped cost curve and natural monopoly, assumption P.V (or P.I) of Starr's *General Equilibrium Theory* is not fulfilled and we cannot be sure that a general competitive equilibrium will exist.

   • In these cases, U-shaped cost curves and natural monopoly, does the Second Fundamental Theorem of Welfare Economics (Theorem 12.2 and Corollary 12.1 of Starr's *General Equilibrium Theory*) apply? Can a Pareto efficient allocation generally be supported as a market equilibrium with redistribution of endowment? Explain your answer.

3. Using the notation of Starr's *General Equilibrium Theory* (chapters 8 – 11), the (strong form) Walras' Law can be stated as

$$p \cdot Z(p) = 0$$

where $Z(p)$ is the N-dimensional excess demand function.

The Walras' Law is sometimes interpreted as saying that if all markets but one clear, then the remaining market must clear as well. Demonstrate this result.

4. This question uses the model of Starr's *General Equilibrium Theory*, section 15.2.

In a monetary economy, when a firm wishes to finance a profitable investment project, it borrows money, makes the investment, repays the borrowing and interest out of the profits of the investment.

Consider a non-monetary economy with a full set of futures markets over time without uncertainty. Denote the present as date 0, and suppose there are a finite number of future periods, T.   Explain how firms' investment decisions can be financed in this economy, specifically:

Firm j has profitable investment opportunities at dates 0 and 1 where j can acquire equipment that will produce marketable outputs at dates 2, 3, …, T . How can j arrange to buy and pay for its 0 and 1 inputs using the futures markets?

5. Consider majority voting over pairwise alternatives subject to agenda manipulation. Use the following voting rule and preference profile. There are three propositions to choose among, X, Y, and Z. There are three voters, 1, 2, 3. The notation > indicates strict preference.
Rules: There is a chairman who sets the agenda, the order of voting. He announces two propositions to choose between; the winner of that vote faces a runoff against the remaining alternative.
Consider the cyclic preference profile:
Voter 1: X > Y > Z
Voter 2: Y > Z > X
Voter 3: Z > X > Y

Claim: Under the cyclic preference profile the chair can arrange that any one of the three propositions be the winner. He does this by choosing the order in which the propositions are considered.

Demonstrate the claim. [Hint: If the chair wants the vote to come out with X the winner, which two propositions does he propose for a vote first? And if he wants Y to be the winner? And if he wants Z?]

6. Same setting as question 5. Now consider the single peaked preference profile:
Voter 1: A > B > C
Voter 2: B > C, B > A, (C vs. A preference is unspecified)
Voter 3: C > B > A
Claim: Under the single peaked preference profile, the choice is independent of the order of the agenda.
(a) Demonstrate the claim.
(b) Discuss with regard to Black's Single Peaked Preferences Theorem (Theorem 1, Class notes for Lecture 26)
[Hint: voter 2 is the median voter, and his favorite point is B].