Economics 611   Game Theoretic Microeconomics   Spring 2007
Second Exam

All Syracuse University policies and procedures concerning academic honesty apply to this course:

"Syracuse University students shall exhibit honesty in all academic endeavors. Cheating in any form is not tolerated, nor is assisting another person to cheat. The submission of any work by a student is taken as a guarantee that the thoughts and expressions in it are the student's own except when properly credited to another. Violations of this principle include: giving or receiving aid in an exam or where otherwise prohibited, fraud, plagiarism, the falsification or forgery of any record, or any other deceptive act in connection with academic work. **Plagiarism is the representation of another's words, ideas, programs, formulae, opinions, or other products of work as one's own either overtly or by failing to attribute them to their true source.**" (Section 1.0, University Rules and Regulations)

**WARNING!!!**

While homework problems may have been done cooperatively, **exams are individual work.** Do not communicate about this exam with **anyone** except the instructor [x3-2345 or e-mail to jskelly@maxwell.syr.edu]. **Violation of this rule will result in a grade of 0 for the exam.** Any notices will be sent to you by e-mail; **check occasionally.**

**EXPLAIN** your answers carefully.

**DUE:** 9:30 am, Tuesday, April 10, in class.
1. (Signaling) Suppose there are three productivity types, low, medium, and high with equal numbers of workers in each type and

\[ 0 < \theta_L < \theta_M < \theta_H \]

All reservation wages are 0. Use the cost function

\[ C(e, \theta) = \frac{e^2}{\theta}. \]

A. Does there exist a completely separating equilibrium?
B. Does there exist an equilibrium where H-types are separated but the L and M types pool?
C. Does there exist an equilibrium where the M-types are separated but the L and H types pool?
[Your answer may depend in some cases on the magnitude of the \( \theta \)s.]

2. (Signaling) With two productivity types, analyze education as a signal with two modifications at the same time:

I. Individuals get some positive utility from education:

\[ U(w, e) = e + w - c(e, \theta) \]

and

II. Education affects productivity: A type \( \theta \) worker produces \( \theta(1 + e) \) units of output when her education level is \( e \). Use the cost function

\[ c(e, \theta) = \frac{e^2}{\theta}. \]

Assume high productivity workers have \( \theta = 2 \) and \( r = 0 \) while low productivity workers have \( \theta = 1 \) and \( r = 0 \). What is the maximum amount of education a high productivity worker might choose at a separating equilibrium?
3. (Screening)  

Redo the determination of the properties of a separating equilibrium for the case where there are three productivity types, low, medium, and high with equal numbers of workers in each type and

\[ 0 < \theta_L < \theta_M < \theta_H \]

All reservation wages are 0. Use the cost function

\[ C(e, \theta) = \frac{t^2}{\theta}. \]

Identify all subgame perfect Nash equilibria.

4. (Screening)  Redo the determination of the properties of a separating equilibrium for the case where task level affects productivity: A type \( \theta \) worker produces \( \theta(1 + \mu t) \) units of output when her task level is \( t \). Use the cost function

\[ C(e, \theta) = \frac{t^2}{\theta}. \]

Assume high productivity workers have \( \theta = 2 \) and \( r = 0 \) while low productivity workers have \( \theta = 1 \) and \( r = 0 \). In particular, show that it is now possible that both types of workers obtain the optimal task level - the one that would be chosen if you were at competitive equilibrium with perfect information.

Extra credit. (Screening) Which of the Lemmas and Propositions of Section D still hold if preferences do NOT satisfy single-crossing? For each that fails, provide an example showing failure.