Economics 611   Game Theoretic Microeconomics   Spring 2008
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, Thursday, April 3, in class.**
1. (Signaling) There are two types, H and L, high and low productivity. $\theta_L = 1$ and $\theta_H > 1$. For education level $x$,

$$U_i = w - C(x, \theta)$$

$$= w - \frac{e^x - 1}{\theta_i}$$

(A) Determine - as functions of $\theta_H$ - the minimum $x_m$ and maximum $x_M$ values of $x$ that H-types choose as part of a separating signaling equilibrium.

(B) (Comparative statics) Determine the signs of $D_{\theta_H} x_m$ and $D_{\theta_H} x_M$. Which derivative is larger?

2. (Signaling) There are two types, H and L, high and low productivity. $\theta_L = 1$ and $\theta_H = 2$. For education level $x$,

$$U_i = x + w - C(x, \theta)$$

$$= x + w - \frac{x^2}{\theta_i}$$

A fraction $\lambda$ of the workers are H-type. Consider an equilibrium where half of the H-types and half of the L-types are separated and the rest of the workers are pooled.

(A) Determine - as a function of $\lambda$ - the education levels $x_L$, $x_p$, and $x_H$ chosen.

(B) Determine the signs of the derivatives of these levels with respect to $\lambda$. Compare these derivatives by magnitude.
3. **(Screening)** There are two types, H and L, high and low productivity, with parameters $\theta_L$ and $\theta_H > \theta_L$. For task level $t$,

$$U_i = w - C(t, \theta)$$

$$= w - \frac{e^t - 1}{\theta_i}$$

Productivity depends on task level: $P_i = \theta_i (1+t)$. A fraction $\lambda$ of the workers are type H. Determine any separating equilibria. (Don’t worry about pooling or splitting contracts that might break the equilibrium.)

4. **(Screening)** Consider the possibility of a splitting contract that breaks a separating equilibrium (Figure 13.D.8) We want to know if this can happen when there is NOT a pooling contract that breaks the separating equilibrium (as in Figure 13.D.7).

**(A)** Show that for $\theta_L = 1, \theta_H = 2$,

$$U_i = w - C(t, \theta)$$

$$= w - \frac{t^2}{\theta_i}$$

there does not exist a $\lambda, 0 < \lambda < 1$, where no pooling contract breaks, but there is a splitting contract that breaks.

**(B)** Find $\theta_L, \theta_H$, cost functions $C(t, \theta)$, and $\lambda$ such that there does exist a splitting contract that breaks though there is NOT a pooling equilibrium that breaks.