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 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, February 19, in class.**
Economics 611 Game Theory  Spring 2009  First Exam  

EXPLAIN your answers carefully. DUE: 9:30 am, Thursday, February 19, in class. The four problems are each worth 25 points.

1.  A. There are five players. For each individual i, the strategy space is $S_i = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. If players choose $(s_1, s_2, ..., s_5)$, the mean of the $s_i$ values is $m$. Player i wins if she has the minimum of $|s_i - (2/3)m|$. Then $100 divided equally among those who win. Are there any Nash equilibria? If so, what are they?

B. Same question except that, for each individual i, the strategy space is $S_i = [0, 10]$, the closed interval of real numbers.

2. A law is passed requiring a monopolistic soft-drink manufacturer to separate the production department and the marketing department. The marketing department chooses the price $P \geq 0$ to charge for a bottle of the firm’s soft drink and the production department chooses the level of output $Q \geq 0$. The two departments are forbidden to discuss their decisions with each other and, therefore, move simultaneously. Managers in both departments own shares in the firm and want to maximize its profits

$$\pi = P \cdot S - Q^2$$

where S denotes the firm’s sales. Sales can not exceed the firm’s output, nor can they exceed the market demand. Unsold output is thrown away. This means $S = \min\{Q, D(P)\}$ where market demand is

$$D(P) = 10 - 2P \text{ if } P \leq 5 \text{ and } D(P) = 0 \text{ if } P > 5$$

Are there any Nash equilibria? If so, what are they?
3. For the following game, are there any subgame perfect Nash equilibria? If so, what are they? Are there any other Nash equilibria? Separately treat the cases \( X \geq 0 \) and \( X < 0 \).

4. Consider this question from last year's exam: There are two players. Player #1 offers a point \( s_0 \in \mathbb{R} \). Player #2 can then accept \( s_1 \) or reject it; in the latter case the outcome is the status quo value \( s_0 \in \mathbb{R} \). If #2 accepts, the outcome is \( s_1 \). Player #2's preferences are represented by \(- (s - b_2)^2\) where \( b_2 \) is #2's bliss point, while player #1's preferences are represented by \( s \) (i.e., she prefers higher values of \( s \)).

Now consider the following modification. There are two periods. In the first period, the above game is played. In the second period, the game is played again, but the default status quo point is now the outcome of the first period game.

Payoffs are the undiscounted utilities of the outcome at the end of the second period.

Are there any subgame perfect Nash equilibria? If so, what are they? [Assume \( s_0 < b_2 \).]