MATH601 Spring 2008
Exam 7: Game Theory

Please read all directions carefully. For this exam, you may not use any books, notes, or other aids apart from a calculator. Please write all solutions clearly and legibly, on separate paper, indicating what work applies to which problem. Cross out incorrect statements, this may improve your grade. Thoroughly justify your solutions. Your grade on the first two problems will be 25-50 points. If you wish, you may revise one of these problems for extra credit, due on Friday 5/9. Your grade on this problem will become the average of your original grade and the revised grade, rounded down. You have as much time as you need, up to the whole class period; good luck!

1. Consider the position $(7, 11, 13, 15)$ in Nim. Find all the winning moves.

2. Consider the Hackenbush game consisting if a single stalk of length n, where the edges are alternately labeled (starting from the ground) $L, R, L, R, \ldots$. Let $f(n)$ denote the value of this game. For example, $f(0) = 0, f(1) = 1, f(2) = 1/2$. Prove that these values are ordered as $f(0) < f(2) < f(4) < \cdots < f(5) < f(3) < f(1)$.

3. (2 extra credit points) Please evaluate the units we have covered[1], by ranking them from favorite to least favorite. Ties are permitted, and please indicate if you liked (or disliked) any of them especially.

4. Your final will be on Wednesday, May 14, 3:30-5:30pm, in the usual room, GMCS307. You may bring one sheet of paper with notes and formulas, and a calculator.

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[1]Naturals (senary), Reals, Hyperreals, Cardinals, Ordinals, Surreals, Game Theory