Combinatorial Analysis 21-301: Fall 2003 Homework. HW10 due Monday 11/24/2003

Q1: In **Empty and Divide** there are two boxes. Initially, one box contains m chips and the other contains n chips. Such a position is denoted by (m, n) where m > 0 and n > 0. A move consists of emptying one of the boxes and dividing the contents of the other between the two boxes with at least one chip in each box. There is a unique terminal position, namely (1,1). The last player to move wins. Determine which positions are P-positions and which positions are N-positions and how to win the game from an N-position.

Q2: Analyse the following variant of Nim and then show that Rims below is this game in disguise. After removing chips from a pile, a player can if so desired, split the remainder of the pile into two sets. The winner is still the player that takes the last chip.

Rims A position in the game of Rims is a finite set of dots in the plane, possibly separated by non-intersecting closed curves. A move consists of drawing a closed curve through any positive number of dots but not touching any other curve. Players alternate moves and the last to move wins.

