

Math 167: Mathematical Game Theory – Homework 2

Due: January 20, 2017

Exercise 1 (Staircase Nim).

Exercise 1.a from the book of Karlin and Peres (page 20).

Exercise 2.

Exercise 1.7 from the book of Karlin and Peres (page 33). To clarify/simplify, player I can only move upwards and player II only downwards.

Exercise 3.

Exercise 1.8 from the book of Karlin and Peres (page 33). Discuss also whether this game is impartial or partisan, progressively bounded or not. What can we say about the existence of winning strategies for n positive odd? Illustrate this for $n = 8$ and $n = 10$.

Exercise 4.

Design your own impartial, progressively bounded combinatorial game, for which one can find a winning strategy by associating to it a Nim-like game (just as in up-and-down rooks above). Describe the game positions, the legal moves and the function B as well. Discuss why is your game impartial and progressively bounded. Be as original as possible (i.e. do not write an already existing game; and at the first look it should be completely different from Nim, subtraction or up-and-down rooks). Change a bit the rules of the your game to get a partisan game that does not have tie. Describe the winning strategy here as well.