



CIS 623, Fall 2018

Assignment 8: Infinite Lists

Due: Monday, November 26

What

- Read Chapter 9 of Bird and study the exercises and their solutions, trying your hand at it first.
- Implement in Haskell the *Iterated Prisoner's Dilemma* as defined in the Wikipedia entry for that topic. Can you use cyclic lists as Bird did on *Rock-Paper-Scissors*?
- (*This is an exercise in thinking recursively, but involves only a mathematical calculation.*) Calculate the value of the *continued fraction*

$$\mu = 1 + \frac{1}{1 + \frac{1}{1 + \dots}}$$

- Implement *formal power series* as infinite lists in Haskell, defining operations of *addition*, *multiplication* and *differentiation* as defined in the Wikipedia entry for the topic.
- Compute the sum, by any means, of the infinite series

$$\sum_{n=0}^{\infty} \frac{n^2}{2^n}$$

(*Hint: start by differentiating the geometric series.*)

- Generalize our work on matrices from the *Sudoku* chapter by implementing infinite matrices. Do multiplication and transposing work the same? Can you come up with different definitions? Can you examine the time complexity of your implementation(s)?
- Define an *approximation ordering* on your infinite matrices.

You will not submit any work for this homework, but your command of the content will be assessed on the final.