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## Programming Languages and Types Group Exercise 8

## G8.1 Church Numerals

Implement Church numerals in Haskell or Scheme and add the following functions:

- 1. functions that translate ordinary Haskell/Scheme natural numbers into their Church encoding and back
- 2. a function exp on Church numbers such that result of exp a b corresponds to a<sup>b</sup>.

## G8.2 Progress

Complete the proof of the progress theorem for Arithmetic Expressions from the slides.

## G8.3 Preservation

Complete the proof of the preservation theorem for Arithmetic Expressions from the slides.