Serie 7 - Denotational Semantics

Exercise 1

Answer the following questions:

- What is the difference between syntax and semantics?
- How can you specify semantics as mappings from syntax to behaviour?
- Does the calculator semantics specify strict or lazy evaluation?
- Does the implementation of the calculator semantics use strict or lazy evaluation?
- Why are semantic functions typically higher order?

Exercise 2

Consider a language of decimal numerals. The numeral ‘123’ is intended to denote the number 123, and ‘876’ to denote the number 876. We define the syntax of decimal numerals as:

\[
\text{Numeral ::= Digit} \\
\quad \quad | \text{Numeral Digit} \\
\text{Digit ::= 0} | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9
\]

Define the semantic functions and the domain of this language. As a test evaluate ‘876’.