

Homework 2: CFGs and Inductive Definitions using Judgments

Programming Languages Concepts (CSCI 3030)

Submit a single PDF file of your solution set on D2L.

All questions must be in order.

All assignments not adhering to this will not be graded.

0. Write a context-free language for the following:

Strings of characters 0 and 1 such that there are always two more 0's than 1's.

1. Give a derivation of 01001 using your solution to problem 0.
2. Consider the judgment $l_1 \text{ QS } l_2$ which can be read as:

The list l_2 is the sorted version of the list l_1 using quick sort

It's defined by the following rules:

$$\frac{}{[] \text{ QS } []} \text{ E} \qquad \frac{[s \in xs \mid s \leq x] \quad [b \in xs \mid b > x]}{(x : xs) \text{ QS } (sms ++ [x] ++ bgs)} \text{ D}$$

- (a) Derive the judgment $[5, 1, 4] \text{ QS } [1, 5, 4]$.
- (b) Show that the judgment $[7, 3, 9] \text{ QS } [3, 9, 7]$ fails to hold.