Homework set 14: Simple programs in ML — due Wednesday 21 March

Total number of points available on this homework is 100. Full credit is equivalent to 100 points.

1. (40 pts.) Represent Scheme S-expressions as follows: for Scheme atoms, use

   \texttt{datatype Atom = Nil | Num of int | Id of string}

   For the lists themselves, use:

   \texttt{datatype } \alpha \texttt{Sexp = Leaf of } \alpha \texttt{ | ConsNode of } \alpha \texttt{ Sexp } * \alpha \texttt{ Sexp}

   Write a function \texttt{sexpprint} to convert an S-expression into a character string in the usual Scheme output format.

2. (60 pts.) Continuing the preceding exercise, write a function \texttt{sexpparse} to parse a character string containing the text of an S-expression. For any valid expression \( e \) of type \texttt{Atom Sexp}, it should be the case that \( e = \texttt{sexpparse}(\texttt{sexpprint } e) \).