Harvey Mudd College
Computer Science 65
Fall 2008

Assignment 6
Regular Expressions from DFAs
Due. 11:59 p.m., Friday, 17 Oct. 2008

This is the last assignment before fall break. After the break, there is a **mid-term exam** over the course material thus far. The exam is closed-book, except that you may use one two-sided 8.5" x 11" sheet of notes that you have *prepared in advance* of the exam (i.e. before the class at which the exams are distributed.) The exam may be taken at home, in any **two-hour** contiguous period between end of class on Wed. 10/22 and start of class on Mon. 10/27. *Contiguous* means that once you start the exam, you must finish it without interrupting the process. The exam conduct is governed by the HMC Honor Code.

Problem:

Construct a Scheme function **dfa2re** that has one argument: a Moore machine using the S expression representation for machines from the previous assignment. By convention, a state is accepting iff it has an output of 1, and the first state listed is the initial state of the machine.

The output of **dfa2re** is regular expression in a prescribed S expression representation:

Representation	Meaning
lambda	The set consisting of just the **empty string**
empty	The **empty set**
any single letter	The set consisting of one string of just that letter.
(**+** *R S . . .*)	The set that is the **union** of the sets represented by the regular expressions *R*, *S*, …
(**^** *R S . . .*)	The set consisting of **concatenation** of strings, the first from the set represented by *R*, the second from the set represented by *S*, …
(***** *R)*	The set consisting of any number (including 0) of concatenations of elements of the set represented by *R*

You may restrict the + and ^ operators to be binary if you wish, or allow them to be of arbitrary arity.

You may produce the result in simplified form for extra credit if you wish, but it is not required. For example, **(+ lambda (* 0))** can be simplified to **(* 0)**.

Examples will be provided in the test file on the website.