CSE 401 - Homework Assignment #1

Due: Wednesday, January 16, 2008 (at the beginning of class)

0. Write regular expressions for each of the following:
   a. All strings over the alphabet \{a, b, c\} that contain at least one \(a\) and
      one \(b\).
   b. All strings over the alphabet \{a, b, c\} where the first \(a\) (if there is
      one) precedes the first \(b\) (if there is one).
   c. All strings over the alphabet \{0, 1\} that contain an odd number of 0’s
      (a string must contain at least one 0).

1. Convert the following regular expression to a NFA:
   \[ a \left( ( b \mid a^* c ) x \right)^* \mid x^* a \]

2. Convert the NFA into a DFA, following the algorithm from class. Be sure to
   label the NFA states and to label each of the DFA states with a set of NFA states.

3. The regular grammar specifying lexically correct programs for MiniJava is given
   as follows: \textbf{Program} ::= (\textbf{Token}|\textbf{Whitespace})^*
   a. Modify this specification to require that all tokens be separated by whitespace,
      and optionally allow whitespace at the start and/or end of the program.
   b. Why does this language-change remove the need for the longest-match meta-
      rule?
   c. Do you think this would be a good language design change? (justify your
      answer)

Produce a hard-copy of your answers and turn them in by the start of class on the due
date. Do these exercises individually, not with your project partner.