CSC 363, Winter 2010 — Short Assignment #2 Solution

1) Scan the input tape, checking the syntax of the DFA encoding, and setting tape 2 to the largest state number that appears in the transition table.

   a) Reject if the first symbol on tape 1 is not $, otherwise move right on tape 1.
   b) Reject if tape 1 does not see R or A, otherwise move right on tape 1.
   c) Move the head on tape 2 to the beginning.
   d) As long as tape 1 sees a 1 symbol, write a 1 on tape 2, and move right on tapes 1 and 2.
   e) Reject if tape 1 does not see 0, otherwise move right on tape 1.
   f) Move the head on tape 2 to the beginning.
   g) As long as tape 1 sees a 1 symbol, write a 1 on tape 2, and move right on tapes 1 and 2.
   h) If tape 1 sees a $, go to stage 2; otherwise go to stage 1b.

2) Check that the maximum state number in the transition table is not greater than the number of states.

   a) Move the head on tape 2 to the beginning.
   b) Move the head on tape 1 to just after the initial $ symbol.
   c) If tape 1 sees a $ symbol, reject.
   d) If tape 2 sees a blank symbol, go to stage 3.
   e) Move tape 2 to the right. Move tape 1 to the right to the next cell with R, A, or $.
   f) Go to stage 2c.

3) Copy the input string for the DFA to tape 2.

   a) Move the head on tape 2 to the beginning.
   b) Move the head on tape 1 rightward to the cell after the next $ symbol.
   c) Copy symbols from tape 1 to tape 2 (moving to the right), until a blank symbol has been copied.
      Reject if any symbol other than 0, 1, or blank is encountered.

4) Simulate the operation of the DFA until the end of the input string is reached, keeping the number of the current state on tape 3 and the head of tape 2 at the symbol currently seen by the DFA.

   a) Move the head on tape 2 to the beginning.
   b) Move the head on tape 3 to the beginning, and the head on tape 1 after the initial $ symbol.
   c) If tape 3 sees a blank, go to stage 4f. Otherwise, move right one cell on tape 3.
   d) If tape 1 doesn’t see an R or A, move right on tape 1 until an R or A is encountered.
   e) Go to stage 4c.
   f) If tape 2 sees a blank symbol, go to stage 5.
   g) Move the head on tape 3 to the beginning.
   h) If tape 2 sees a 1, go to stage 4l.
   i) Move right one cell on tape 1.
   j) As long as tape 1 sees a 1 symbol, write a 1 on tape 3, and move right on tapes 1 and 3.
   k) Write a blank on tape 3 and then go to stage 4b.
   l) Move right on tape 1 until the cell after the next 0.
   m) As long as tape 1 sees a 1 symbol, write a 1 on tape 3, and move right on tapes 1 and 3.
   n) Write a blank on tape 3 and then go to stage 4b.

5) Decide whether to accept or reject according to the type of state we ended in.

   a) If tape 1 sees an R, reject; if it sees an A, accept.