CS 3530: Assignment 6a

Fall 2014

Exercises

Problem 3.8c (20 points)

Problem

Give implementation-level descriptions of Turing machines that decide the following languages over the alphabet $\{0, 1\}$. Note: Sipser describes the differences between *formal descriptions*, *implementation-level descriptions*, and *high-level descriptions* on pages 156–157.

c. $\{w : w$ does not contain exactly twice as many 0s as 1s$\}$

Solution

M = on string w:

1. Scan the tape and mark the first unmarked 1.
   if no unmarked 1s are found *accept*.
   else go to step 2.

2. Scan the tape and mark the first unmarked 0.
   if no unmarked 0s are found *accept*.
   else go to step 3.

3. Scan the tape and mark the first unmarked 0.
   if no unmarked 0s are found *accept*.
   else go to step 4.

4. Scan the tape and mark the first unmarked 1.
   if no unmarked 1s are found go to step 5.
   else go to step 2.

5. Scan the tape and mark the first unmarked 0.
   if no unmarked 0s are found $reject$.
   else *accept*.