## CS 383

## HW 7

## Due in class Wednesday, December 4.

This doesn't need to be typed but it must be legible.

1. Design a TM to accept $\left\{w^{\text {rev }} \mid w \in(0+1)^{*}\right\}$ (i.e., even-length palindromes) For this one draw out the TM as a complete state-transition diagram.

For the remaining questions give a step-by-step description in English of the TM, but it is not necessary to draw out the state-transition diagram. For example, one step with question (1) might be "If the first letter of the input is 0 , overwrite it with a blank and move right until you find a blank, then move one step left...."
2. Design a Turing Machine to accept the strings that have the same number of 0 's and 1 's, such as 000111 and 010101.
3. Design a TM to accept $\left\{w w \mid w \in(0+1)^{*}\right\}$ You might find non-determinism helpful.
4. Design a TM that starts with the binary code for a number $N$ on its tape and ends with the code for $N+1$. So if it starts with 10011 it ends with 10100 and if it starts with 1111 it ends with 10000.
5. Here is a non-deterministic TM. Find all configurations that can be derived from A011


