Due in class Wednesday, April 12

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

1. Design a TM to accept \( \{ww^{rev} \mid w \in (0+1)^*\} \) (i.e., even-length palindromes)

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 \( \{ww \mid w \in (0+1)^*\} \) You might find non-determinism helpful. It is sufficient to break this into steps that can clearly be handled by a TM; you don’t need to write out all of the states and transitions unless you want to.

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 \( q_001 \)