Homework Assignment #9
Due: December 1, 4:00 p.m.

1. Recall that $B(n)$ is the binary representation of the natural number n (with no leading 0's). Let $L = \{B(n)\#B(n+1) : n \geq 1\}$. For example, $B(18) = 10010$ and $B(19) = 10011$, so $10010\#10011$ is in L. The string $111\#1000$ is also in L. The strings $011\#100$, $100\#100$, $1001\#$ and $11\#0\#\#00$ are not in L.

 Give a high-level description of a Turing machine that decides L. The amount of detail that I want you to give is similar to the 4-step algorithm on page 146 of the textbook or the 5-step algorithm on page 147. You do not have to draw the transition diagram of your Turing machine. However, your description should be precise enough that somebody could use it to draw the transition diagram without having to think.

 (Just for fun, you can also prove L is not context-free, but don't hand that proof in.)