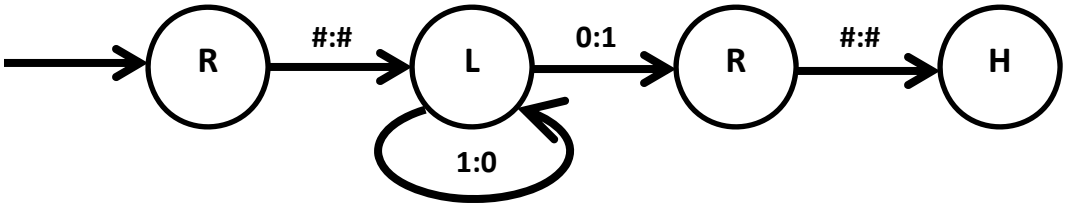
Turing Machines (Booksite Section 7.4)

1. (whole class) Trace this Turing Machine on the tape shown below.



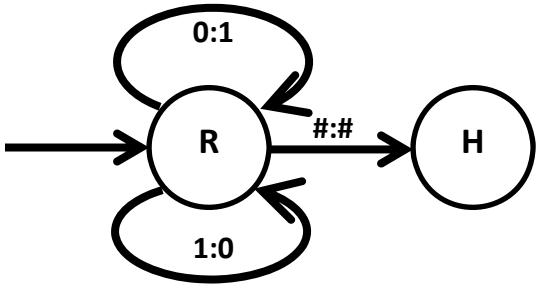
…	#	#	#	0	1	0	1	0	0	1	1	0	1	1	1	#	#	#	…

initial position

2. What does this Turing Machine do in general?

(Go to the demo from lecture to double-check; this machine is "`Binary Incrementer`"*. Then run* "`Power of 2 Decider`"*. How does that TM work?)*

3. (individual) Trace this Turing Machine on the tape shown below.

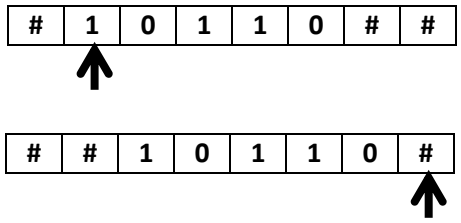


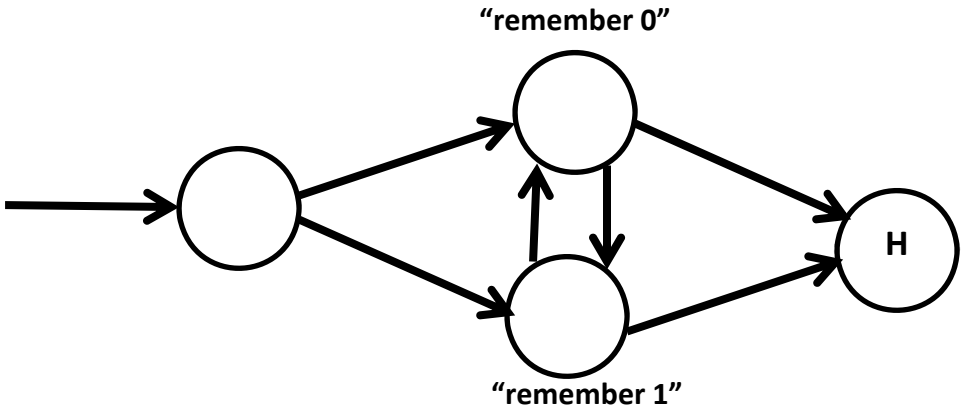
…	#	#	1	0	1	0	#	#	…

Attention: in the first step, it should write 0 before it moves right.

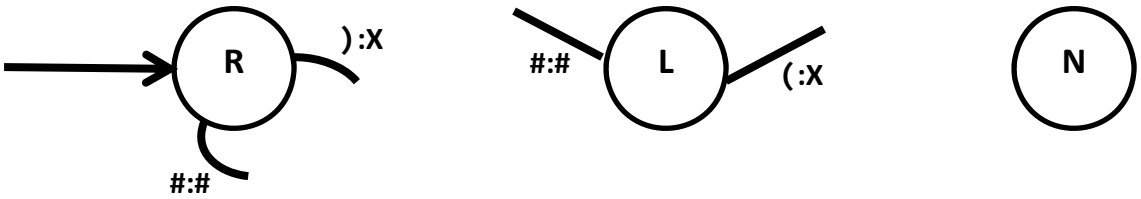
4. What does this TM do in general? (Assume it always starts on leftmost bit.)

5. (Pairs/groups) Complete the following TM so that it shifts the binary input right by one position.
(E.g. if it starts with the top tape at right, it should end with the bottom tape at right.)
Assume it always starts on the leftmost nonempty (non-#) tape cell.





6. (Bonus) Complete the following TM so that it accepts well-formed balanced parenthesis expressions like **(( ) ( ))** or **((( )))** and rejects badly-formed ones like **(( )** or **) (**. Assume it starts on the left edge of the input. You have to determine the new target of each transition.



7. (Bonus) Design a TM that reverses its input.