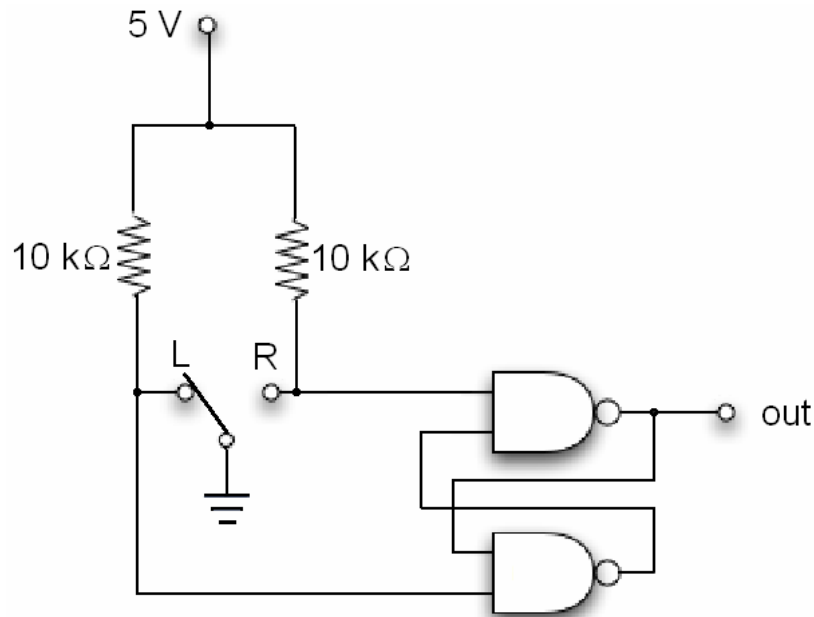


### Problem T14

In the circuit below, two NAND gates are used to debounce a single-pole double-throw (SPDT) switch.



- Make a truth table showing the circuit output for the switch in the left position (L) and right position (R).
- Explain the operation of the circuit, addressing how it debounces. You may assume that (i) when the switch bounces, most of the contact/no-contact oscillations have a period  $\sim 5$  ms, (ii) the NAND gates respond to changes in their input  $\sim 10$  ns.
- Suggest additions to the circuit to improve its performance. Sketch your improved circuit.