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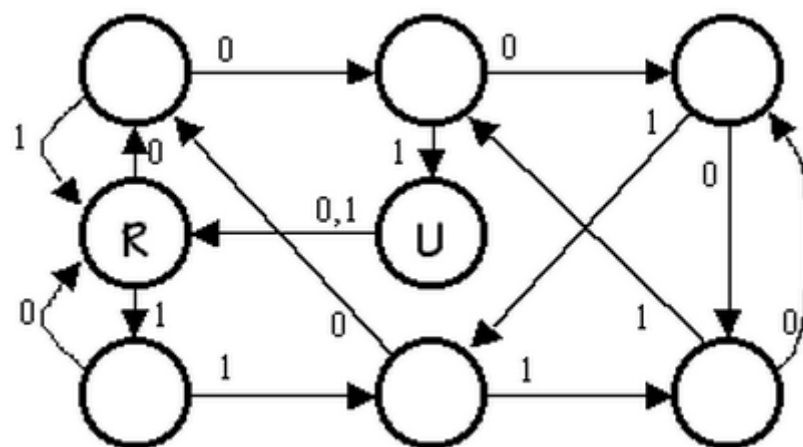
LE6.1

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LE6.1.1 State Transition Diagrams

4/4 points (ungraded)

Ben Bitdiddle has designed an electronic lock with three buttons: "reset", "0" and "1". He has provided the following state transition diagram showing how the lock responds to a sequence of inputs.



The lock makes a transition from its current state to a new state whenever one of the three buttons is pressed and released. It ignores its inputs if more than one button is pressed. Pressing "reset" returns the lock to the state marked "R" in the diagram (arcs showing the transitions to the reset state have been omitted from the diagram to make it easier to read). Pressing "0" or "1" will cause the lock to follow the appropriately labeled transition from its current state. The lock opens if it reaches the state marked "U".

(A) After pressing the "reset" button what is the length of the shortest sequence of button presses that will open the lock?

Length of shortest unlock sequence:



(B) After pressing the "reset" button what is the length of the longest sequence of button presses that will cause the lock to open after the last button in the sequence is pressed but not open any earlier in the sequence? Enter 1000 if the sequence is unbounded.

Length of longest unlock sequence:



(C) After much use, the "reset" button breaks. Is it still possible to open the lock using only the "0" and "1" buttons assuming you know nothing about the lock's state (except that its locked!) when you start?

☒ Yes

☐ No



(D) Suppose Ben wanted to design a lock that required exactly 10 button presses to open after pressing "reset". What is the minimum number of states his FSM would need in addition to the RESET (R) and UNLOCK (U) states?

Number of additional states:



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What's your method for C? (when the reset button breaks).

I think there can be multiple solutions for this. Mine was to just keep on pressing 1 repeatedly, and I verified it by checking what woul...

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