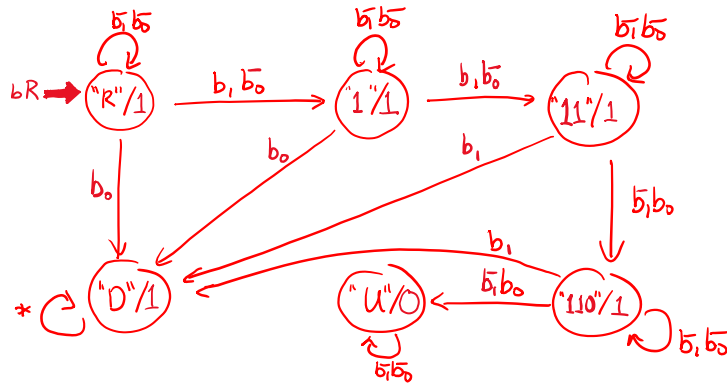# Design of Digital Circuits and Systems, Quiz 1

FSMs
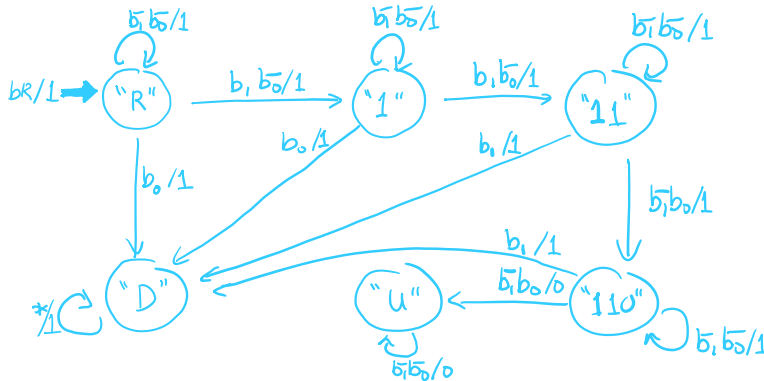
Solution Outlines

Part A:

Notes:

- State names: shown above, reset ("R"), dead ("D"), unlocked ("U"). Anything appropriate was accepted (*e.g.*, "1100" instead of "U", "0" instead of "R").
- Output signal: it's Lock, so should be a 1 when locked and a 0 when unlocked.
- The omitted transitions out of the unlocked state should be as described below in Part C.
- Input values of 0 and 1 could have been given for b1 and b0 – assumed ordering b1b0 if not specified.

Part B:

Full credit if explanation matches state diagram. Ideally, pushing both buttons simultaneously would lead to the "dead" state, otherwise it would be a security flaw (*i.e.*, just mash both buttons 4 times to unlock).

Part C:

Three logical decisions were:

1) Any non-reset button press (b_1 or b_0) takes it to the dead state.

2) Any non-reset button press (b_1 or b_0) takes it to the reset state.

3) All non-reset transitions ($*$) remain in the unlocked state.

Options 1 and 2 are probably better for safety to protect against someone just rapidly trying to guess the combination. Option 3 might be for convenience or to mirror the dead state.