Problem #4

One of the many possible solutions:
(a) States: S0, S1, S2, S3 (stuck), S4
   Inputs:
   - Reset
   - Left to the first correct number
   - Right past zero to the second correct number
   - Left to the third correct number
   - Close the lock
   - Right past zero a few times (t urn the dial right past zero a few times)
   - Else
   Outputs:
   - Closed
   - Open
   Assumptions:
   At state S0, once the dial is turned to the left and the number entered
   matches the first number in memory, advance to S1. At states S1 and S2,
   assume the user only dials to the right direction and stops at the correct
   number or he does, there are no intermediate stops. So the lock can only
   advance to the next state or it gets stuck at S3 until it is reset.

(b)
Problem #5
One of the many possible solutions, depending on the level of abstraction:

(a) In order to make the lock combination “programmable”, add two more input buttons. Input “program” is used to set the lock to program mode, and input “set” is used to save the number just entered into memory.

(b) Assumption:
For safety and security purpose, the lock combination can only be programmed when the lock is open and is set to program mode. Once it is set to program mode, the old combo is cleared. A number (0-39) can be saved to memory only when the set button is pressed regardless of the dialing direction. After three numbers are saved and the lock is closed, the new combo is set.