cpts 317 Homework #0

1. Consider the following two languages on alphabet $\Sigma = \{a, b\}$: L_1, the set of all words w on the alphabet such that w contains at least three a's; L_2, the set of all words w on the alphabet such that w contains the same number of a's and b's.

$L_1 = \{aaa, aaab, baaa, ababab, aaaaa, aaaaab \ldots\}$

$L_2 = \{aabb, aaabbb, bbaa, bbbaaa, abab \ldots\}$

The robot is holding two flowers of colors Red and Blue, if the Red is showing then the event is a, if the Robot shows Blue then the event is b

1) please program the robot such that the set of all its observable behaviors is exactly L_1

- The robot has to show red flowers at least three times for it to be L_1 after showing three Red flowers they could be any number of Red and Blue flowers then it would belong to language L1.

In State 1 bba then state 2 is ba, at state 3 it ends, this is not the final state this means the robot has to show red flowers to belong to belong to language L1.

2) The Robot has to follow the language L_2 and it MUST show any equal number of Red and blue flowers. The sequence is bab which means the red and blue flowers shown by the robot but are not equal, so the top of the stack has to show the opposite color to make the red and blue flowers are equal.

3. This program needs either fixed or finite memory and the next program needs unbounded memory. Program 1 you need a certain number of Red flowers more than 3 and any number of flowers. If the Red flowers are shown then the robot must recall the place in the stack and to make the # of blue flowers equal to red, program 2 must be unbounded.

4. w_1 = "aaabababbaabb" is L_1

w_2 = "aaaaaaaaabbbbbbbbb" is L_2

w_1 seems to be more complex than w_2, any # of a's or b's will result the final state and belong to L_1 but in case of w_2 the automata there will be 9 a's and 9 b's, the issue of the program is it has to pop the a's for every occurance of 'b' so as per the space complexity point of view the program 1 required very less and constant space which is O(1) but program 2 requires unbounded space is dependant on the string length or Program 2 which O(n).