CSC236 Problem Set 2

Question 4.

(a). After the last occurance of a, if a is at the last or the number of bs after last occurance of a are even, the I end up in circle L, otherwise, I'm end up in R.

(b). Let S be the set of all finite strings containing only as and/or bs.

Let $s \in S$

Base Case: $s = \varepsilon$. or $s = a$ or $s = b$.

when $s=\varepsilon$, Since ε refer to an empty string, we do not move from the starting point, which is L.

when $s=a$, since a is at the last, we're in L, matches the situation.

when $s=b$. since there's no occurance of a and the number of bs is 1, we're in R, matches.

Induction Step: Let $s \in S$.

Induction Hypothesis: Assume after the last occurance of a, a is at the last or the number of bs after last occurance of a are even, which in L.

WTP: If we add an arbitrary a or b to the end of string s, the statement in a holds.

Case 1. add an 'a'.

Since a represents stay in or move to L. we now at L, satisfying (a).

Case 2. add a 'b'.

Since, from I.H., 'a' is at last or the number of bs after the last occurance of a are even, adding a 'b' causes the number of bs after the last occurance of 'a' be odd. And since 'b' represent move to the circle not standing in and I'm standing in L according to I.H. I'll then move to R, which the statement in (a) still satisfy.

Therefore, I've proved the claim from (a). ∎