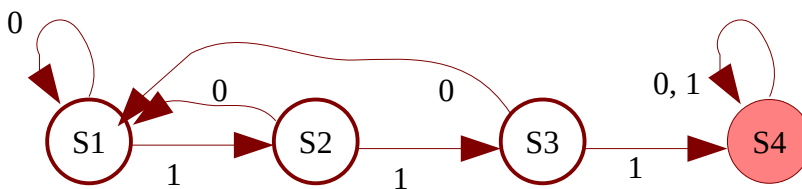


Homework Assignment 3 - Answers

1. Let L_1 be a formal language using the binary digits 0 and 1 as its character set, such that a string is in L_1 if and only if it has 3 or more 1's in a row somewhere in it.

A. Draw a deterministic finite state automaton that recognizes L_1 .

Start state S_1 , accepting state S_4



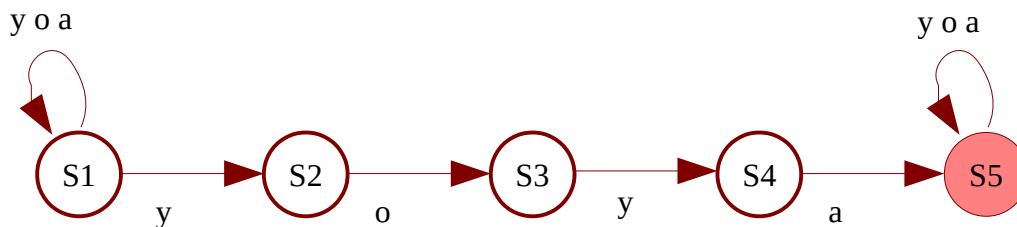
B. Write a regular expression whose language is L_1 .

$(0|1)^* 1 1 1 (0|1)^*$

2. Let L_3 be a formal language using the letters o, a, and y, such that a string is in L_3 if and only if it has the string “yoya” somewhere within it. Note that yyyoyoyaaa is in L_3 , as are yyoya, yoyoya, and yoyaaya, but yoaya is not in L_3

A. Draw a nondeterministic FSA that recognizes L_3 .

Start state S_1 , accepting state S_5 only

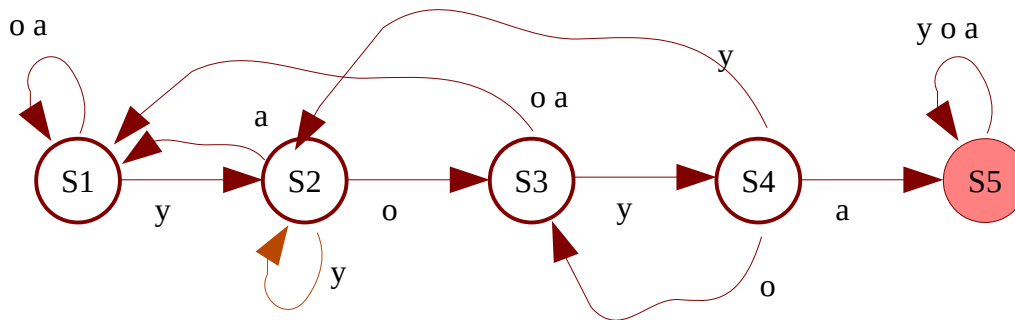


B. Write a regular expression whose language is L3.

$(y|o|a)^* y o y a (y|o|a)^*$

C. (harder) Draw a deterministic FSA that recognizes L3.

Start state s1, only accepting state S5.



3. Describe in English the language of each of the following RE's:

A. $a^*|b^*$ The empty string or 1 or more as or 1 or more bs

B. $(ab)^*$ Zero or more ab pairs

4. Draw a Deterministic FSA that accepts a string made up of the characters x and y if and only if it has at most two xs and has more xs than ys. E.g., your DFA should accept the strings “x”, “xyx” and “yxx” but not “y” or “xyxyx”. It may accept or not accept the empty string “”, whichever you prefer

Note: state Sjk means we have seen j xs and k ys. E.g. S12 means 1 x and 2 ys.

Start state S00, accepting states S10, S20, and S21

