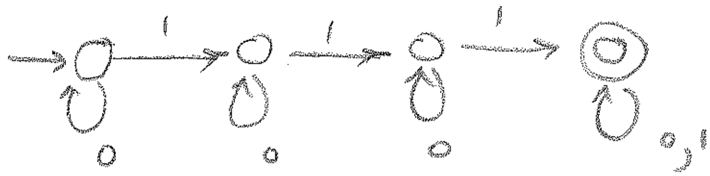
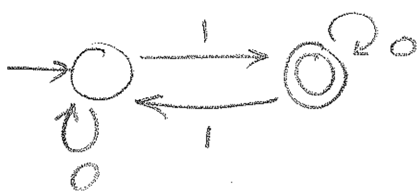
HW1 Solutions

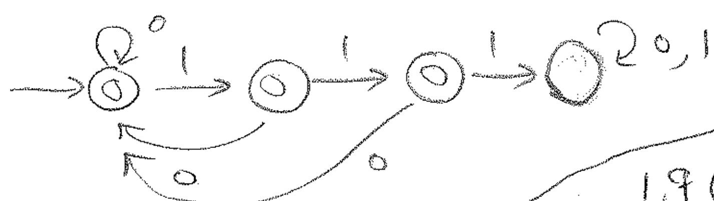
1.9 (a) When three 1's seen accept it all



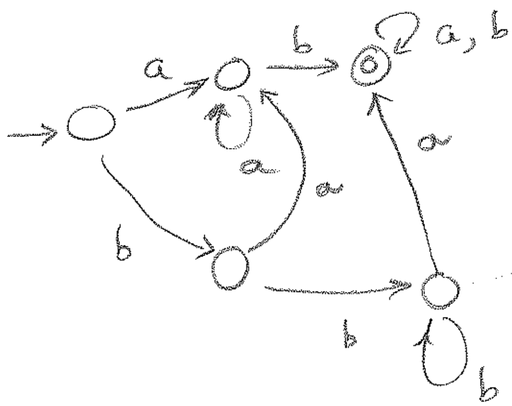
1.9 (b) counting odd involves a loop
that only remembers this fact (odd)



1.9 (c) With 111 as a substring fail

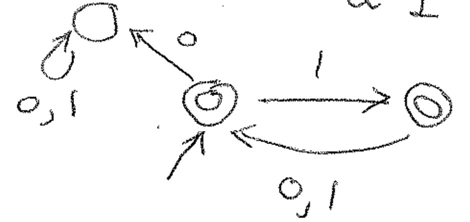


1.15 a b or b b a



1.9 (d)

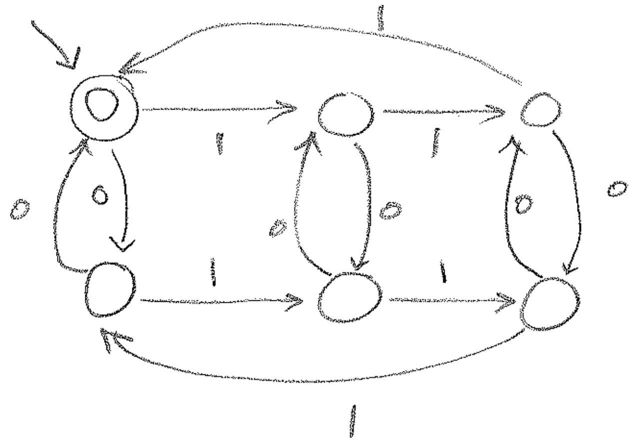
odd posn
a 1



even pos
don't care

ε <u>must</u> be there as it has no odd posn!

1.17 Have a loop for multiple of 3 1's
also remember parity of 0's.



Expect symmetry in the solution.

1.18 All strings with consecutive 1's or 0's

1.19 * Attempt to design $0^n 1^n$ will fail because we can't keep track of # 0s beyond the # of machine states.

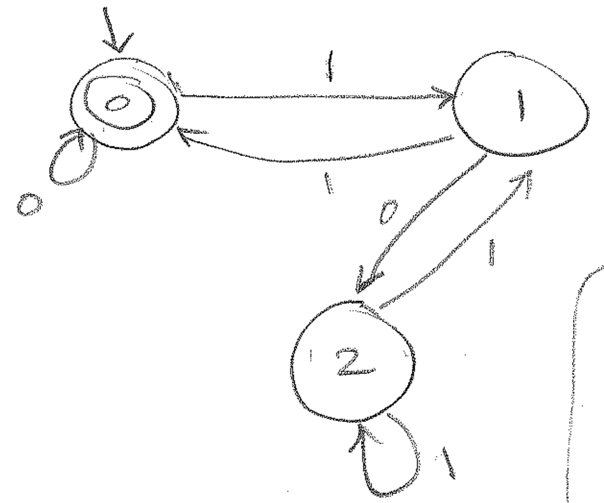
* MSB first mod 3.

$$N \longrightarrow \underbrace{2N}_{\text{Shift number}} + \underbrace{b}_{\text{New bit}}$$

We don't need to remember N; only N mod 3 (N m 3).

$$(2N+b) \text{ m } 3 = (2 \cdot N \text{ m } 3 + b) \text{ m } 3$$

This is the update recipe.



m = % — modulus
= remainder of division

$0 \xrightarrow{b} (2 \cdot 0 + b) \; m \; 3 = b$

$1 \xrightarrow{0} (2 \cdot 1 + 0) \; m \; 3 = 2$

$1 \xrightarrow{1} (2 \cdot 1 + 1) \; m \; 3 = 0$

$2 \xrightarrow{0} (2 \cdot 2 + 0) \; m \; 3 = 1$

$2 \xrightarrow{1} (2 \cdot 2 + 1) \; m \; 3 = 2$

Do the writing practise of these math items

$\{\{a\}\}$

$\{\varepsilon\}$

$\{\phi\}$

$\{\varepsilon, \phi\}$?

a

aa

aa concat ε

concat ab.