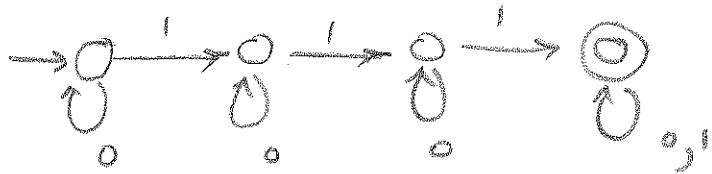


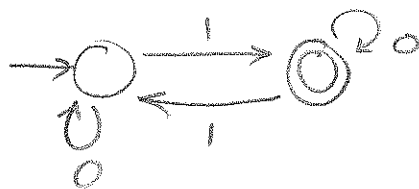
HW1 Solutions



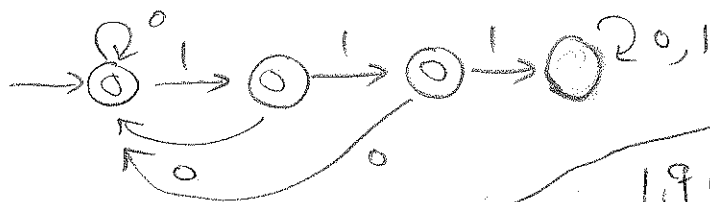
1.9(a) When three 1's seen accept it all



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

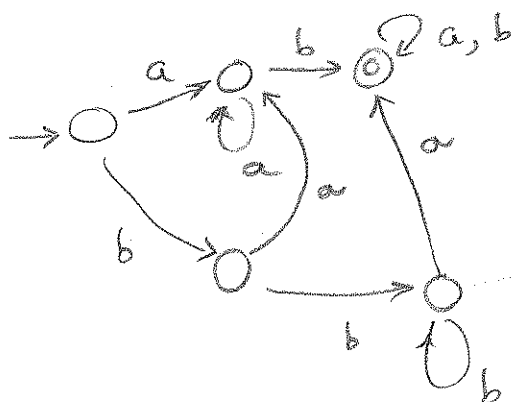


1.9(c) With 111 as a substring fail

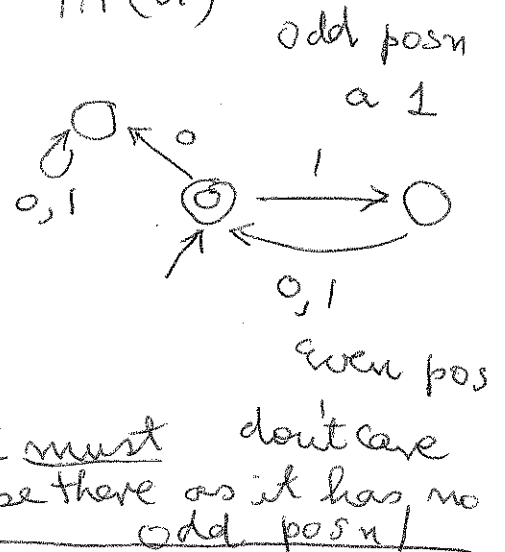


1.15

ab or bba

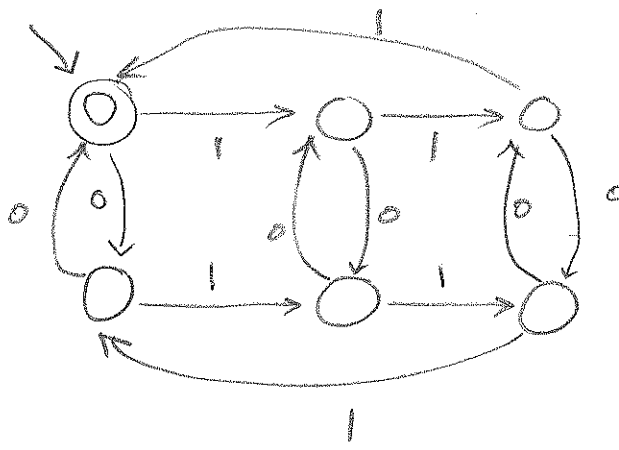


1.9(d)



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 * A attempt to design $0^n 1^n$
will fail because we cant keep track
of #0s beyond the # of machine
states.

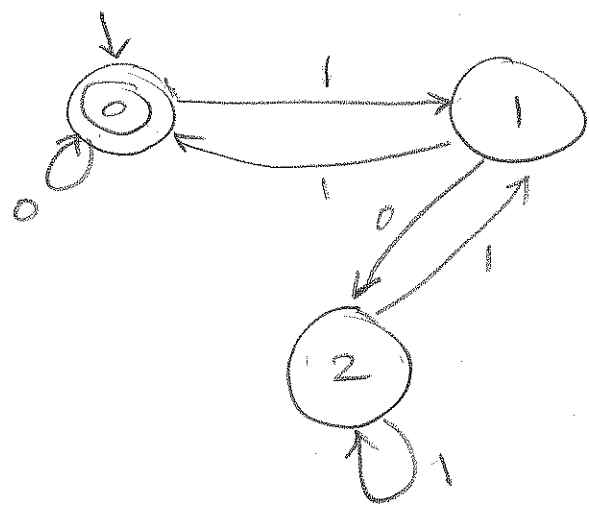
* MSB first mod 3.

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

We dont need to remember N ;
only $N \bmod 3$ ($N \bmod 3$).

$$(2N+b) \bmod 3 = (2 \cdot N \bmod 3 + b) \bmod 3$$

this is the update recipe.



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

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

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

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

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

Do the writing practise of these math. items

$\{ \{ a \} \}$

a
aa

$\{ \epsilon \}$

aa Concat ϵ
Concat ab.

$\{ \phi \}$

$\{ \epsilon, \phi \} ?$