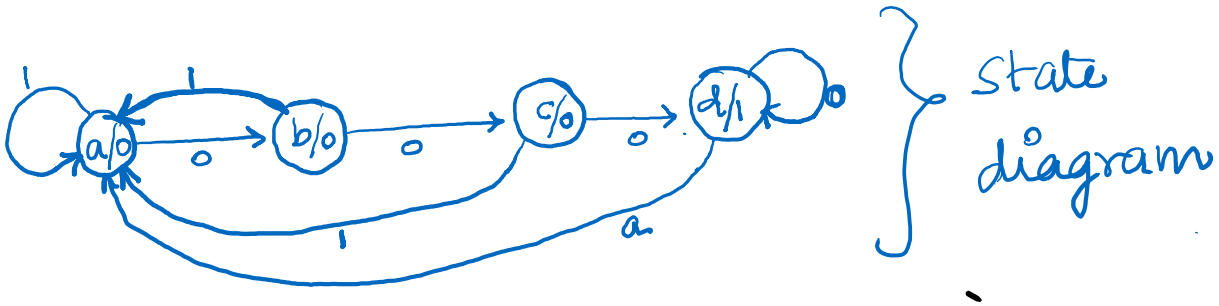
DESIGN PROCEDURE

- From the word description and specifications of the desired operation, derive a state diagram for the circuit.
- Reduce the number of states if necessary.
- Assign binary values to the states.
- Obtain the binary-coded state table.
- Choose the type of flip-flops to be used.
- Derive the simplified flip-flop input equations and output equations.
- Draw the logic diagram.

Design a circuit that detects a sequence of 3 or more consecutive zeros



Binary assignment to the state

a = 00

b = 01

c = 10

d = 11

Binary coded state table:

	Present state A	Present state B	input x	next state A(t+1)	next state B(t+1)	output y
a)	0	0	0	0	1	0
	0	0	1	0	0	0
b)	0	1	0	1	0	0
	0	1	1	0	0	0
c)	1	0	0	1	1	0
	1	0	1	0	0	0
d)	1	1	0	1	1	1
	1	1	1	0	0	1

choose a flip flop to implement the circuit available choices are D, JK, T flip flops

D Flip Flop to implement the circuit

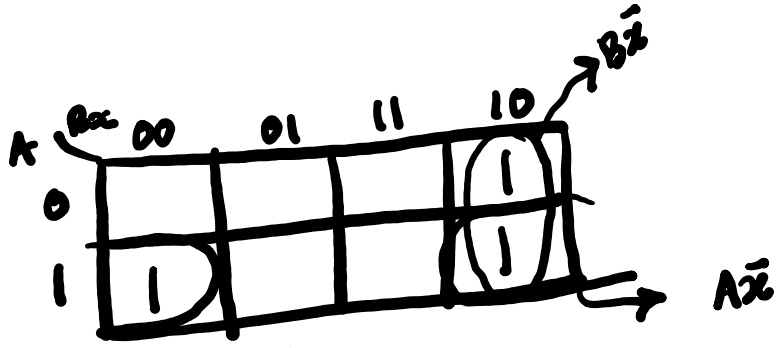
characteristic equation of D Flip flop.

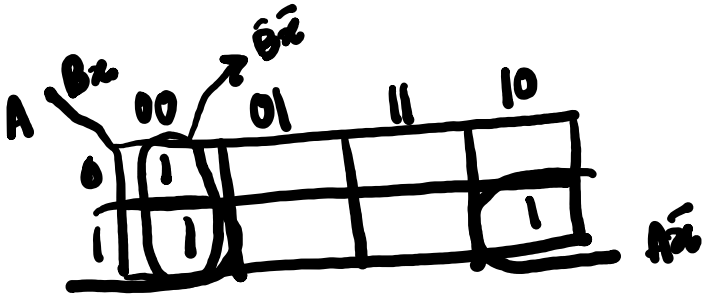
$$Q(t+1) = D$$

$$A(t+1) = D_A = A\bar{x} + B\bar{x}$$

$$B(t+1) = D_B = A\bar{x} + \bar{B}\bar{x}$$

$$y = AB$$





$A(t+1) = A\bar{x} + B\bar{x}$

$B(t+1) = A\bar{x} + \bar{B}\bar{x}$

$y = AB$.