Example of one-hot encoding with DFFs.
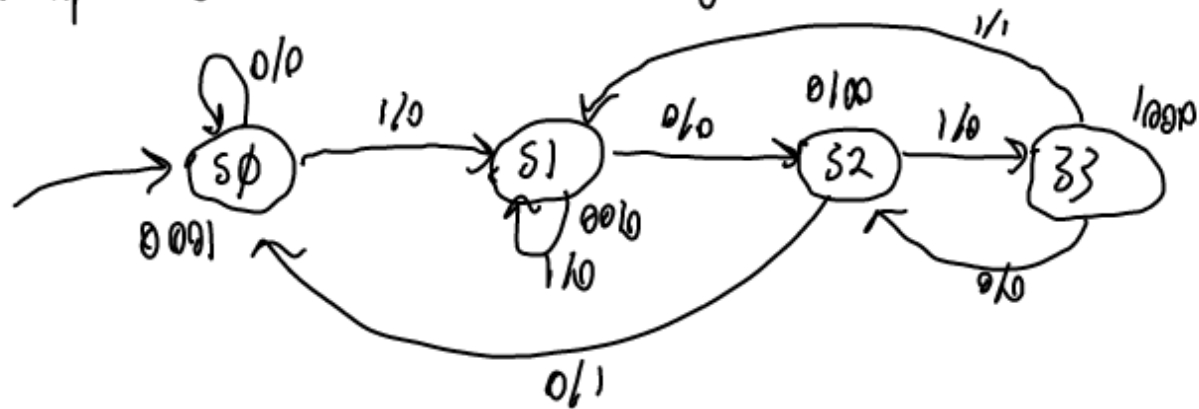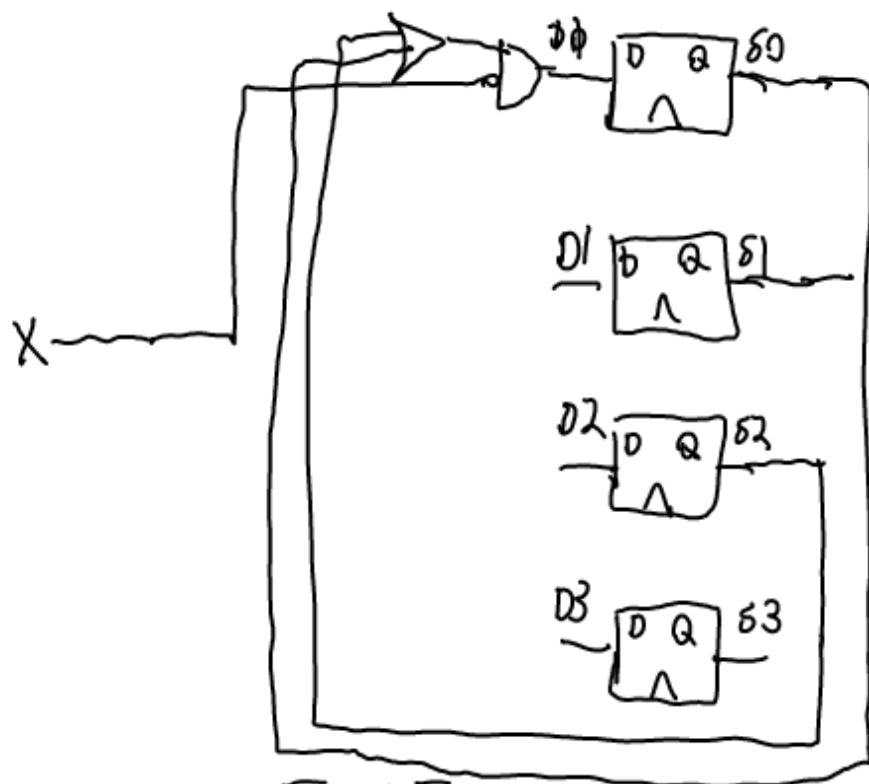

4-states
1 input x
1 output z

blah blah blah

$D\phi = S\phi \cdot \bar{x} + S2 \cdot \bar{x}$

$D1 = S\phi \cdot x + S1 \cdot X + S3 \cdot X = x \cdot (S\phi + S1 + S3)$

$D2 = S1 \cdot \bar{X} + S3 \cdot \bar{X}$

$D3 = S2 \cdot X$

$Z = S3 X + S2 \bar{X}$

State Reduction

* sometimes we might have a state diagram/table with more states than are really needed.
* Might be useful to identify states which are the same (equivalent) $\Rightarrow$ such states can be replaced (grouped) into one state.

Two states are the same if.

1) They produce the same outputs under all input conditions.

2) They have the same next state (or equivalent next state) under every input condition. graphical method
↙ for collapsing states.

Can use an implication chart + merger diagram to figure out equivalents.

↑
table that tells me the conditions under which 2 states are equivalent.

e.g.

Curr. State	Next State		Output (Z)	
	A=0	A=1	A=0	A=1
S0	S3	S2	1	1
S1	S0	S4	0	0
S2	S3	S0	1	1
S3	S1	S3	0	1
S4	S2	S1	0	0

Implication Chart

S1	✗			
S2	✓	✗		
S3	✗	✗	✗	
S4	✗	(S0,S2)✓	✗	✗
	S0	S1	S2	S3

X : due to output vals.
X : due to next state

Merger Diagram.
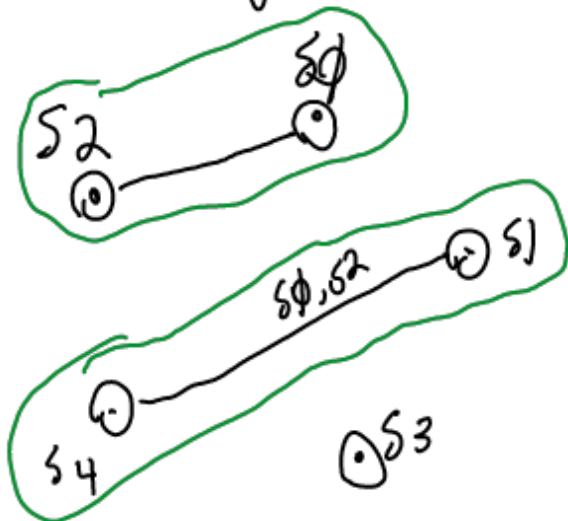
① Find cliques of nodes connected by edges.

② Ensure all conditions on any grouped edges are satisfied.

Clique: a set of nodes with edges between every pair of nodes.

Curr	Next		Output	
	A=0	A=1	A=0	A=1
(S0, S2)	S3	(S0,S2)	1	1
(S1, S4)	(S0,S2)	(S1,S4)	0	0
S3	(S0,S2)	(S1,S4)	0	1