Vending Machine FSM Requirements

- Accepts nickels, N, (five cents) and dimes, D (ten cents)
- Dispenses an item, I, after 15 cents has been input
- Does not give change
- Only one coin can be inserted at a time (N, D, or neither)

N	D
0	0
0	1
1	0

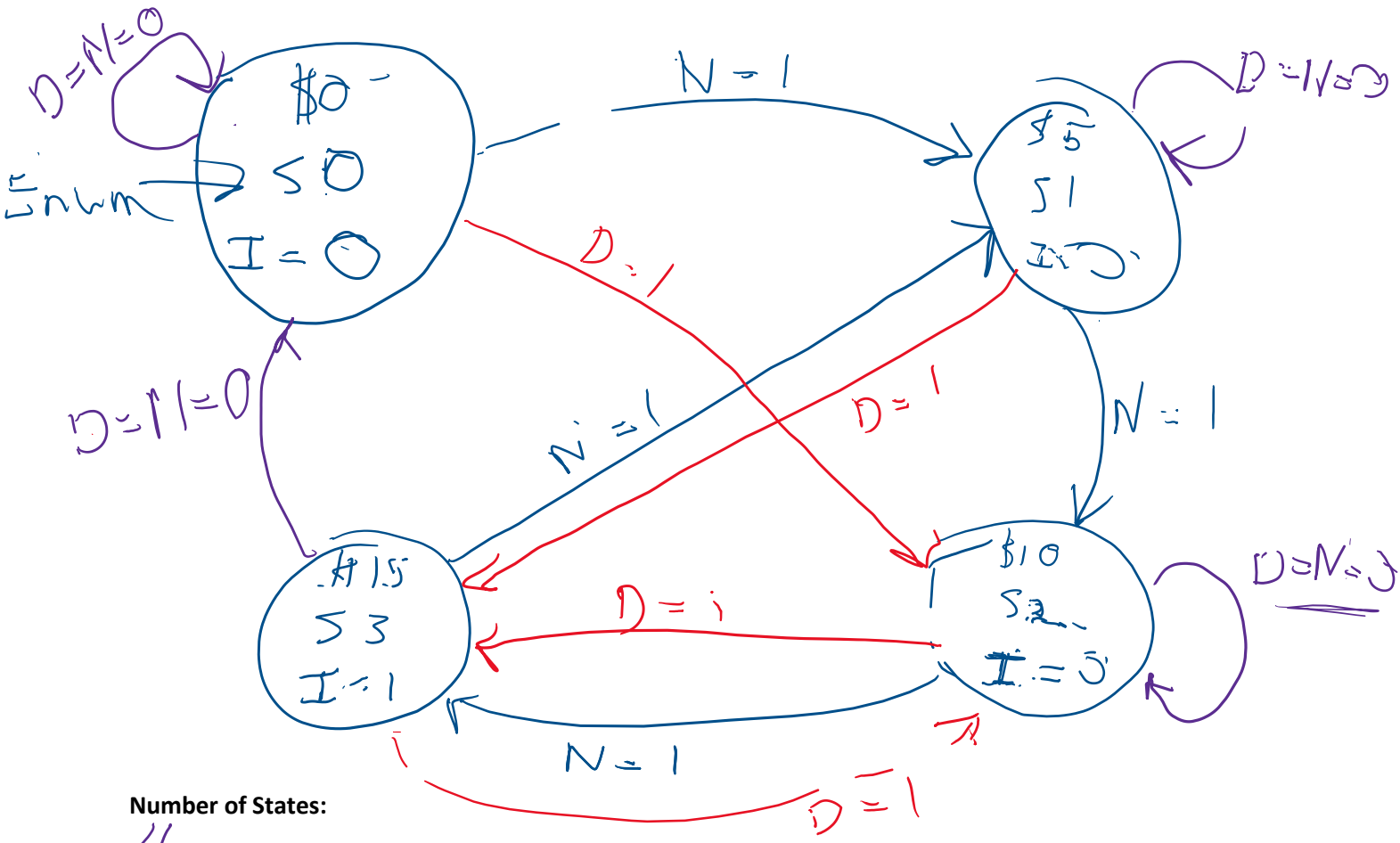
Determine Inputs and Outputs:

Inputs: Nickel & Dime

Outputs:

I (item)

State Transition Diagram: $ in the machine



Number of States:

4

Bits of State Memory (# of D-FFs):

2 FF 2 bits

State Transition Table

Current State S	Encoded State $S_{1:0}$		Inputs D	N	Next State S^*	Encoded Next State $S^*_{1:0}$	
S0	0	0	0	0	S0	0	0
S0	0	0	0	1	S1	0	1
S0	0	0	1	0	S2	1	0
S0	0	0	1	1	x	x	x
S1	0	1	0	0	S1	0	1
S1	0	1	0	1	S2	1	0
S1	0	1	1	0	S3	1	1
S1	0	1	1	1	x	x	x
S2	1	0	0	0	S2	1	0
S2	1	0	0	1	S3	1	1
S2	1	0	1	0	S3	1	1
S2	1	0	1	1	x	x	x
S3	1	1	0	0	S0	0	0
S3	1	1	0	1	S1	0	1
S3	1	1	1	0	S2	1	0
S3	1	1	1	1	x	x	x

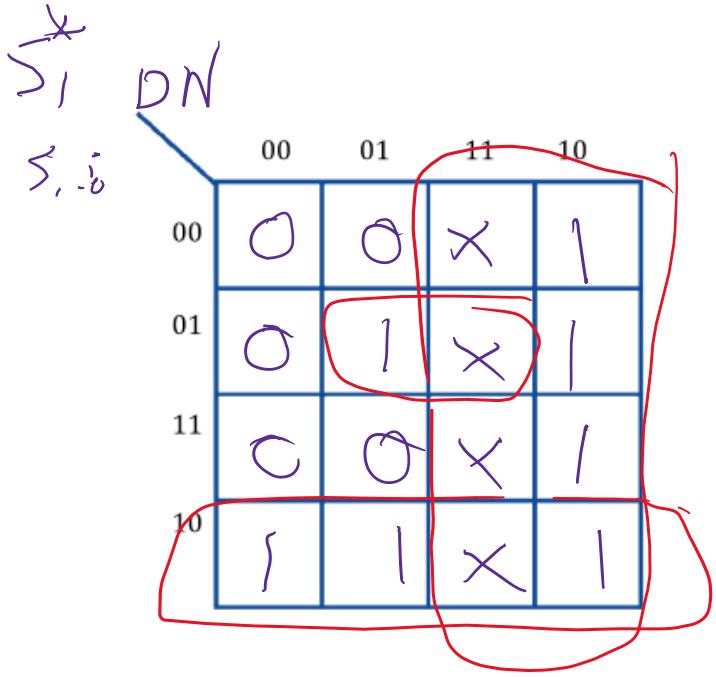
State Encoding Table

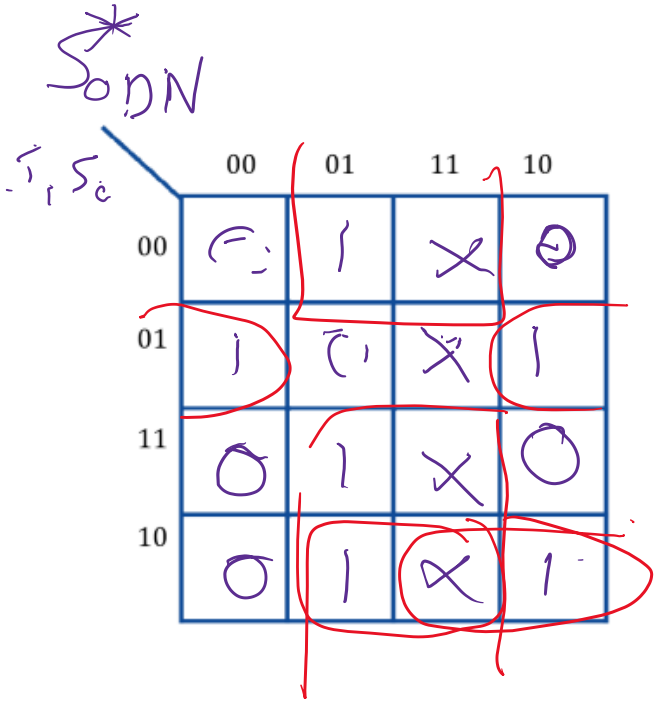
State Name	Encoding $S_{1:0}$
S0	00
S1	01
S2	10
S3	11

Output Table

State Name	Encoded State $S_{1:0}$	Output I
S0	00	0
S1	01	0
S2	10	0
S3	11	1

Next State Logic $S^*_{1:0}$





Output Logic I

$$I = S_3 = S_1 S_0$$