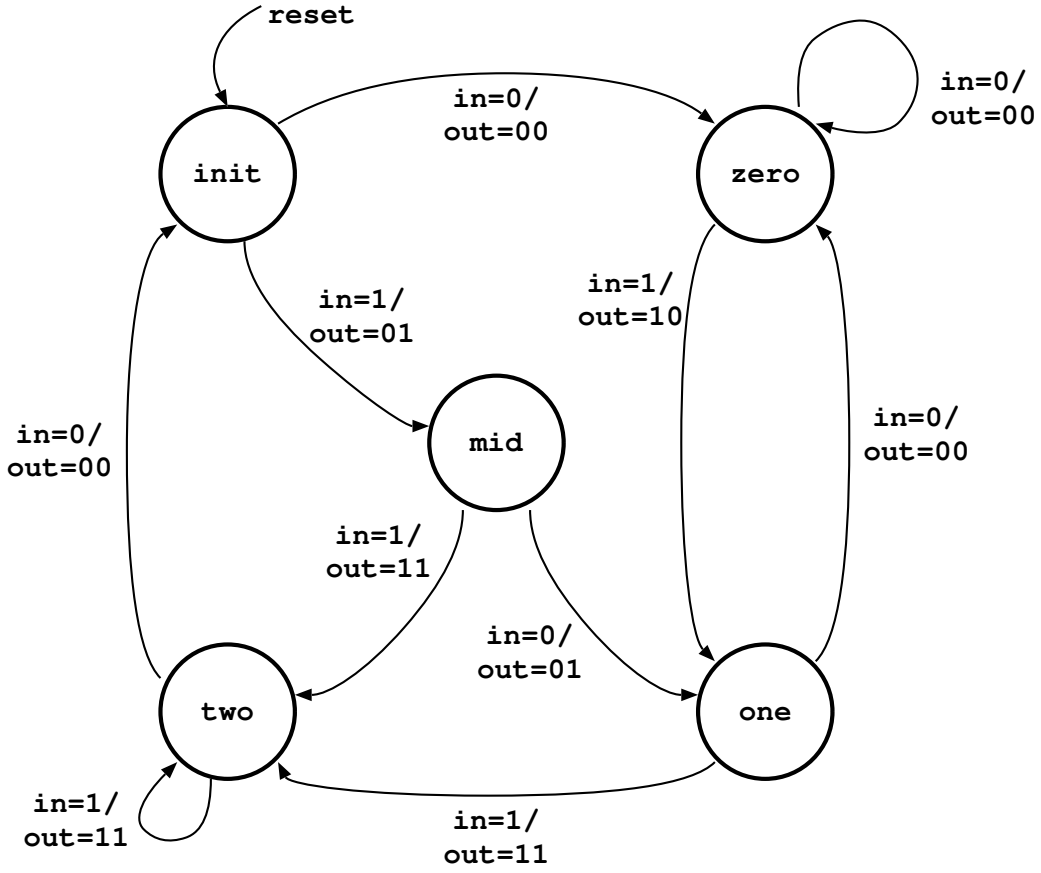
3. In this question you will be given the state transition diagram for a Finite State Machine (FSM). The FSM has a two-bit output "`out[1:0]`" as well as a single bit input "`in`".



(a) (2 points) Is this a Mealy or Moore type of FSM, briefly explain why?

Solution: This is a Mealy type of FSM, as the output depends not only on the state but also on the present value of the input.

(b) (5 points) Using the following state encoding table, complete the state transition and output table on the following page.

State	**Encoding**		
Name	S_2	S_1	S_0
`init`	1	1	1
`mid`	1	0	0
`zero`	0	0	0
`one`	0	0	1
`two`	0	1	0

Present State			**Input**	**Next State**			**Outputs**	
P_2	P_1	P_0	in	N_2	N_1	N_0	out_1	out_0
1	1	1	0	0	0	0	0	0
1	1	1	1	1	0	0	0	1
1	0	0	0	0	0	1	0	1
1	0	0	1	0	1	0	1	1
0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	1	1	0
0	0	1	0	0	0	0	0	0
0	0	1	1	0	1	0	1	1
0	1	0	0	1	1	1	0	0
0	1	0	1	0	1	0	1	1

(c) (5 points) Draw a new state transition diagram for this FSM using a different type (if the original was a Moore, then draw a Mealy type or vice versa) that has the same functionality.

Solution: This is one possible solution. Note that states `ZeroA` and `ZeroB` can be merged, however this organization is slightly more regular, and shows the thinking behind the original FSM.