3. (12 points) Create an FSM that detects if an input, $Y$, has been 1 for at least three consecutive cycles of the past four cycles and asserts 1 on the output, $A$, whenever this situation occurs and asserts 0 otherwise. Using the five-step sequential logic design process, convert your state diagram to a controller, implementing the controller using a state register and combinational logic circuit specified by Boolean equations. \textit{Note: You do not need draw the logic gates.}