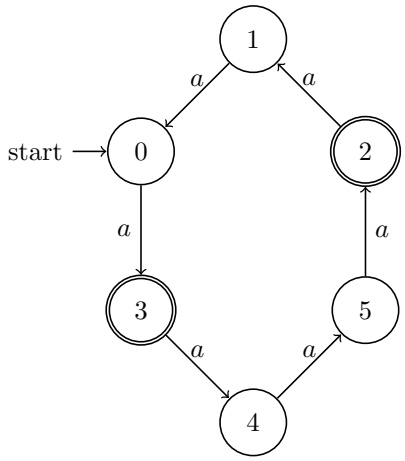
Homework 3: Regular Expressions and Minimization
Theory of Computation (CSCI 3500)

Write the solution to each question on its own page.
All questions must be in order.
Your name must be on each page.
All assignments not adhering to this will not be graded.

0. Using the minimization algorithm for DFAs, convert the following DFA into its equivalent minimal DFA. You must supply the distinction table, the formal definition, and the diagram.



What language do these automata accept?

1. Define a regular expression for the language:

$$L = \{w \in \{0,1\}^* \mid w \text{ has a subword } 101\}$$

2. Prove that the following language is non-regular using the pumping lemma:

$$L = \{w_1 \# w_2 \mid w_1, w_2 \in \{0,1\}^* \text{ and } |w_1|_0 = |w_2|_1 + 3\}$$