Instructions: In academia, the ability to communicate your ideas is just as important as the ideas themselves. Also important is the ability to use the standard tools of your discipline. In Computer Science, one of those tools is \LaTeX{}. Despite the introductory learning curve, \LaTeX{} has a well-deserved reputation for producing beautiful, consistent output, for those who spend the time learning to use it effectively. One of the goals of this class is for you to develop that skill. Unless otherwise specified, all “written” homework should be prepared in \LaTeX{}. A few suggestions follow.

First, it is suggested that you use the website https://www.sharelatex.com. If you use a @nd.edu email, then you will be able to create unlimited private documents. Although the platform makes it possible to share your documents on ShareLatex, you are not allowed to collaborate on homework assignments, as per the class rules in the syllabus.

Second, we realize the learning curve of \LaTeX{} itself, which is why this homework assignment is relatively easier. We want you to have the time to not only solve the problem, but also to typeset it properly in \LaTeX{}.

1. In the textbook: Problem 0.11 in the US edition (page 27), which is Problem 0.12 in the International edition.

2. In the textbook: Problem 0.13 in the US edition (page 27), which is Problem 0.10 in the International edition. See the Errata website for clarification of the problem.

3. Construct a FSM for the following languages. Provide a visual depiction of the FSM, as well as a formal definition in the form of $M = (Q, \Sigma, \delta, q_0, F)$, where $\delta$ is depicted as a transition matrix (see the FSM slides and the TikZ tutorial pdf). For all parts, the alphabet is $\{0,1\}$

   a) $L_1 = \{w | w$ is at least length 3 and its third symbol is a 1$\}$

   b) $L_2 = \{w | w$ doesn’t contain the substring 001$\}$

   c) $L_3 = \{w | w$ contains at least three 0s and exactly one 1$\}$

   d) $L_4 = \{\epsilon, 1\}$