

**CISS362: Introduction to Automata Theory, Languages, and
Computation
Assignment a08**

Name: _____

OBJECTIVES

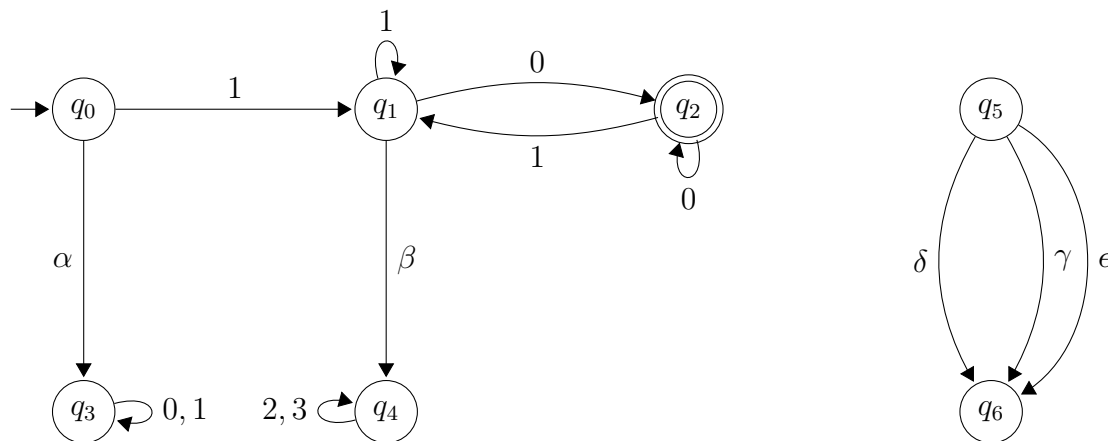
- Design DFAs.
- Design NFAs.
- Design regexes.
- Show a language is regular by designing a DFA, NFA, or regex.
- Show a language construction (operator) is a closed operator on regular languages.
- Show a language is not regular by using the pumping lemma.
- Show a language is not regular by using the pumping lemma and regular operators.

Here are the questions you should work. Some questions have solutions (either from the book or I have written up the solution).

- Sipser 1.29. Q1. Solution to 1.29(a) and 1.29(c) are provided in the textbook. Study it carefully.
- Sipser 1.30. Q2.
- Sipser 1.43. Q3.
- Sipser 1.44. Solution is provided in the textbook. Study it carefully.
- Sipser 1.45. Q4.
- Sipser 1.46. Solution to 1.46(b) is provided in the textbook. Study it carefully.
- Sipser 1.47. Q5.
- Sipser 1.48. Q6.
- Sipser 1.49. Q7.
- Sipser 1.53. Q8.

HOW TO DRAW A STATE DIAGRAM

Here's an example showing you how to draw the elements of a state diagram. Also, look at the solution to 1.3 below.



For more information on drawing state diagrams go to my tutorials and look for `latex-automata.pdf`:

<https://drive.google.com/file/d/1AeE-POWNvQlitzPDxQpGE8bMR9Yc9gMW>

Let me know if you have any questions about drawing state diagram.

Q1. Sipser 1.29.

SOLUTION.

Q2. Sipser 1.30.

SOLUTION.

Q3. Sipser 1.43.

SOLUTION.

Q4. Sipser 1.45.

SOLUTION.

Q5. Sipser 1.47.

SOLUTION.

Q6. Sipser 1.48.

SOLUTION.

Q7. Sipser 1.49.

SOLUTION.

(a)

(b)

(c)

Q8. 1.53.

SOLUTION.

(a) SOLUTION PROVIDED.

$$\begin{aligned}\epsilon, a &\in L(a^*b^*) \\ ba, baa &\notin L(a^*b^*)\end{aligned}$$

(b) SOLUTION PROVIDED.

$$\begin{aligned}ab, abab &\in L(a(ba)^*b) \\ b, b &\notin L(a(ba)^*b)\end{aligned}$$

(c) SOLUTION PROVIDED.

$$\begin{aligned}\epsilon, a &\in L(a^* \cup b^*) \\ ab, ba &\notin L(a^* \cup b^*)\end{aligned}$$

(d)

(e)

(f)

(g)

(h)

Q9.

SOLUTION.