# Lab 2: Finite Automata

## CSCI 340: Computational Models

### 100 points

Submission will be through `autolab.millersville.edu`

In this portion of the lab, you will begin using an automata simulation tool called JFLAP. This java-based software is a suite of tools created by Dr. Susan Rodger's research group at Duke University. You can download your own version of JFLAP at `http://www.jflap.org/`. JFLAP has been installed on all of the machines in the Mac and Linux labs.

To start JFLAP, just click on the icon; the JFLAP main menu will appear on your monitor. For this lab, select Finite Automaton option. For practice, you can create the following FA. Note: this FA accepts binary numbers of the form $8^k + 1 \mid k \geq 0$
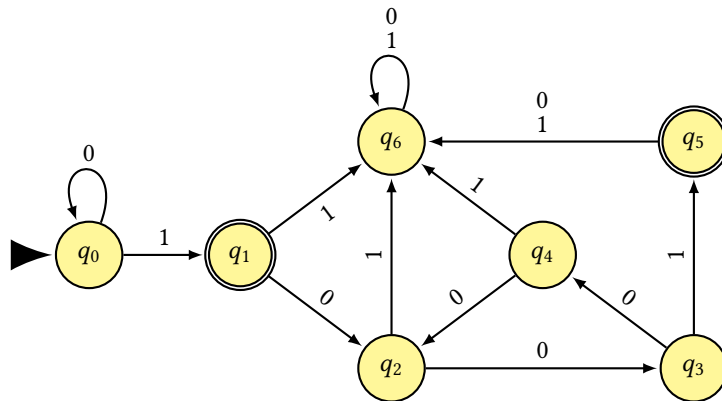


When done test the FA with several inputs. (Under the Input menu, select "Multiple Run" and enter the inputs below.) Be sure that you have constructed the FA correctly, so that the results match those below.

| Input | Result |
| --- | --- |
| 1001 | Accept |
| 1000001 | Accept |
| 10001 | Reject |
| 000100000000000001 | Reject |
| 001000000001 | Accept |

## Steps to Follow

- Go to AutoLab and download the handout for Lab 2. This will give you a `.zip` file with five `.jff` files in it. The structure of the `.zip` file should be:

  ```
  $ zip -sf handout.zip
  Archive contains:
    handout/
    handout/1.jflap.jff
    handout/3.jflap.jff
    handout/5.jflap.jff
    handout/README.txt
    handout/2.jflap.jff
    handout/4.jflap.jff
  ```

- **Do NOT change the file names.** Edit the files in JFLAP to create the appropriate automata.

- When you are ready to submit one or more automata for testing, create a `.zip` file of the directory (**it must still be called handout**). This should *exactly match* the structure of the handout `.zip` file.

- Submit the created `.zip` file to AutoLab.

Remember: These should be FAs according to our definition in Chapter 5 – so there must be exactly one transition from every state on every possible input.

Use the alphabet $\Sigma = \{a \quad b\}$ for these machines.

## FAs to Construct and Submit (20 points each)

1. Build an FA that accepts only those words that have fewer than four letters.

2. Build an FA that accepts non-empty words whose length % 3 = 0.

3. Build an FA that accepts only those words where the next-to-last letter is an $a$.

4. Build an FA that accepts only those words that do not end with $ba$.

5. Build an FA at accepts all strings in which the letter $b$ is never tripled.

## Grading

75 points (5 @ 15 points each) will be automatically graded through Autolab. Note: there is no feedback given – just a rejection message.

The remaining 25 points (5 @ 5 points each) will be based on how many states/transitions are used based from an optimal solution.