Written Assignment 2
Due September 25, 2017 at 12:30pm

You may discuss this assignment with other students and work on the problems together. However, your write-up should be your own individual work and you must acknowledge the students you work with. Some of the questions ask you to write are L programs. You are free to use the L interpreter to develop these programs, but please write (or print) the programs on your homework. Written assignments must be turned in at the start of lecture on the indicated due date.

1. (14 points) Write regular expressions for the following languages over the alphabet $\Sigma = \{a, b\}$.

   (a) (2 points) All strings that end in b.

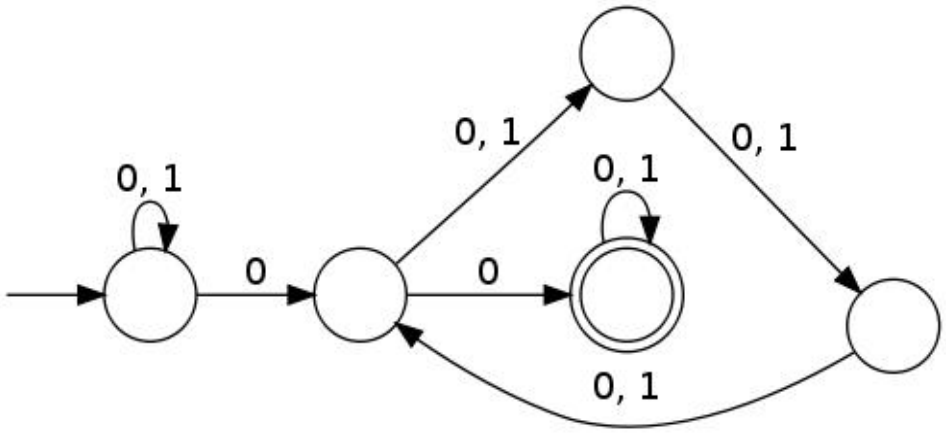
   (b) (4 points) All strings that do not end with aa

   (c) (4 points) All strings that contain an even number of b's.

   (d) (4 points) All strings that do not contain the substring ba

2. (12 points, 4 points each) Draw DFAs for the languages from Question 1 b-d. None of your DFAs may contain more than 4 states.

3. (8 points) Consider the following NFA over the alphabet $\Sigma = \{0, 1\}$:



   Give a one-sentence description of the language recognized by this NFA (4 points). Write a regular expression for this language (4 points).

4. After releasing L to developers, many programmers complain that L does not allow a negative integer constants. For example, programmers would like to write the following in L:

```
let x = -922 in ...
```

Furthermore, programmers complain that allowing leading 0's on integer constants is confusing. For example, the L program

```
let x = 0001 in ...
```

should no longer be legal. Give a `flex` rule that matches this new definition of integer constant. You do not have to provide any action for the rule.