CECS 329 Group Assignment 3

September 23rd, 2021

Instructions

Working together

Pair up with another student to solve both problems below. You are only allowed to discuss the problems with your partner and the lab instructor. Use of course notes, textbook, and lecture recordings is permitted, but no other online resources or outside communication is allowed. Each of you is responsible for authoring a (handwritten) solution to ONE of the problems. For example, if you author the solution to Problem A, then your partner authors the B solution.

Submitting your work

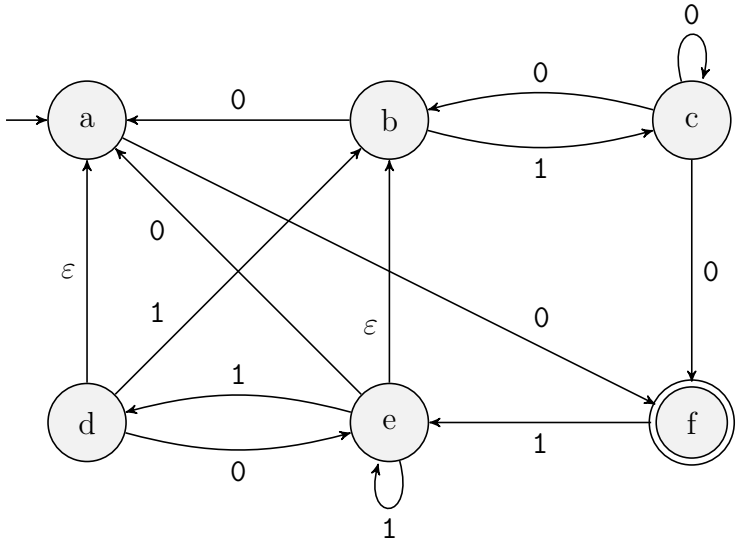
Submit ONE solution to the ONE problem you were assigned. Make sure you write your name as well as your partner's name in the upper-right corner of your solution, since both of you will receive points for each of the solutions. Upload your solution in a single file to the appropriate drop box before the end of class. Showing sufficient work is necessary for receiving maximum points.

Late submissions

Should you submit after the dropbox deadline, solutions received no later than 10 minutes after the deadline will lose 10% of the earned points. Solutions received after 10 minutes but less than 30 minutes after deadline will lose 50% of the earned points. All other late submissions will not be graded.
Bottom line: make it a goal to submit no later than 5 minutes before the drop-box deadline.

Problems

A. Convert the following NFA to an equivalent DFA. Include only those subset states that are reachable from the initial state. (10 pts)



B. Suppose L is a regular language defined over alphabet Σ. Define Odd(L) so that $w \in \text{Odd}(L)$ iff w is the word of odd-place letters of some word in L. For example, if aabaabba $\in L$, then its odd-place letters are abab, and so abab $\in$ Odd(L).

1. Prove that Odd(L) is also regular. Do this by considering a DFA M that accepts L and writing a paragraph that describes how to modify M to create an NFA N that accepts Odd(L). Hint 1: N should behave like M, but should only simulate the reading of every evenly occurring symbol, which can be done with the help of ε transitions. Hint 2: N should have at most twice the number of states as M. (10 pts)
2. Provide a state diagram for N if M is shown below. (5 pts)