**Your name: Joshua Hoshiko**

**Assignment name:** Homework 1

**Date submitted:** 8-26-19

**Time spent on assignment:** ~1.5 hours

**“How’d it go?”**

The five tuple problems involved some research but other than that the assignment was ok.

**Any remaining questions on the material?**

Nope.

**Who you collaborated with or got help from (if anyone), and what references you consulted beyond the text and course notes.**

Completed alone.

**If this is an incomplete assignment, what is missing, or not working? Be specific.**

This assignment is complete.

**Additional discussions specified for an individual assignment.**

None.

**Anything else?**

Nothing that I can think of.

Theory of Computation

Fall 2019, August 21 **Deterministic Finite Automata**

Dr. Gurka (homework)

Due: Tuesday, August 27, beginning of class, on paper; also post to Moodle, time-stamped before class. Both packets should include a cover letter (template on Moodle). No late assignments accepted; partial submissions will receive partial credit. Read specifications carefully. All solutions must be readable.

Create deterministic finite automata (DFA's) for each of the languages given below, using the specified alphabets. For each one, give three good strings and three bad strings, if possible, and the DFA diagram. Test cases (good and bad strings) should be distinct, not similar.  Be sure you test your final DFA. The word "or" as used below is inclusive "or."

This assignment is to be completed with minimal, if any, collaboration. If you need help after working on the problems and consulting the book, come to office hours. The text has exercises that are good for studying and working collaboratively, to learn the material before attempting this homework. Consider comparing your answers with a classmate once you have finished.

Extra credit (no collaboration). Describe a non-trivial language using xor, then give test strings (three good and three bad), and the DFA diagram. Specify your alphabet.

Part 1, Σ = { 0, 1 }

The language of all strings that …

1. contain '0'
2. do not contain '10'
   1. also give a different English description of this language
3. start with '000'
   1. also give a formal definition (5-tuple) of this language
4. start and end with the same character
   1. also give a formal definition of this language
5. contain more than two characters
   1. also give a different English description of this language
6. have an even number of characters (consider zero even)
7. start with '1' and have less than four characters
8. contain '11' or don't end in '0'

Part 2, Σ = { a, b, c }

The language of all strings that …

1. end with 'abc'
   1. also give a formal definition of this language
2. contain exactly four characters
3. have an odd number of characters
   1. also give a formal definition of this language
4. do not have any paired matching characters (i.e., do not contain 'aa' and do not contain 'bb' and do not contain 'cc')
   1. also give a formal definition of this language
5. have at least two 'a's.
6. start and end with different characters
7. do not contain 'cba'
8. end with 'b' and do not start with 'a'
9. have no 'a's