COT 4420: Homework 2
Finite Automata

Unless stated otherwise, the base alphabet in this problem set is $\Sigma = \{0,1\}$.

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1. Tricky: The language L = {w | w contains as many occurrences of the substring "01" as occurences of the substring "10"} is regular. Prove it by giving an FA (deterministic or non-deterministic) for L. Explain why this FA acceepts this language. **[1]**

Examples:

- accepted: 010, 1000101
- not accepted: 011, 010101

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2. Give a DFA for all strings that have an odd number of 1s and an even number of 0s. **[½]**

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3. Give a DFA for the language D:

- ε is in D
- if s is in D, then both s00 and s11 are also in D **[1/2]**

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4. Give an FA (NFA is probably easiest) that accepts {w | w ends with an even munber of 0s}.**[1]**

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5. Specify (in English) an algorithm that takes a DFA (as a graph or a table, your choice) and checks whether the language of the DFA is finite **[1]**
