

HW 4 CMSC 452. Morally DUE Feb 25

1. (0 points) What is your name? Write it clearly. Staple your HW. When is the midterm? Where is the midterm? When is the Final?

2. (50 points)

(a) Let $n_a(w)$ be the number of a 's in w . Let $n_b(w)$ be the number of b 's in w . Draw a DFA that classifies strings depending on which of the following languages they are in:

$$\{w : n_a(w) \equiv 0 \pmod{2} \text{ AND } n_b(w) \equiv 0 \pmod{2}\}.$$

$$\{w : n_a(w) \equiv 0 \pmod{2} \text{ AND } n_b(w) \equiv 1 \pmod{2}\}.$$

$$\{w : n_a(w) \equiv 1 \pmod{2} \text{ AND } n_b(w) \equiv 0 \pmod{2}\}.$$

$$\{w : n_a(w) \equiv 1 \pmod{2} \text{ AND } n_b(w) \equiv 1 \pmod{2}\}.$$

It should have four states which you will label, in the obvious way, 00, 01, 10, and 11.

(b) Let A be the Mu-DFA that has the same Q, Σ, δ, s as the DFA you drew but has for its set of sets of Final states $\mathcal{F} = \{00, 01\} \cup \{01, 11\}$. (RECALL- this means that A ACCEPTS an INFINITE string if either (1) The set of states that are visited infinitely often is exactly $\{00, 01\}$, OR (2) The set of states that are visited infinitely often is exactly $\{11, 01\}$.) Describe in CLEAR ENGLISH the elements of $\{a, b\}^\omega$ that A accepts.

(c) We want a Mu-DFA for the complement of the language recognized by A . Q, Σ, δ, s all stay the same. What is the set of sets of Final states?

3. (50 points) Give Regular Expressions for the following langs. The alphabet is $\{a, b\}$.

(a) All strings that DO NOT have aab as a prefix.

(b) All strings that DO NOT have aab as a suffix.