

## HW 1 CMSC 452. Morally DUE Feb 4

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? IMPORTANT- I WANT TO MAKE SURE I HAVE YOUR CORRECT EMAIL ADDRESSES. I HAVE EMAILED ALL OF YOU USING WHAT I CURRENTLY THINK IS YOUR EMAIL ADDRESS BUT IF YOU DIDN'T GET IT THEN EMAIL ME ASAP TO GIVE ME YOUR REAL EMAIL ADDRESS.
2. (50 points) Let  $n_a(w)$  be the number of  $a$ 's in  $w$ . Let  $n_b(w)$  be the number of  $b$ 's in  $w$ . Write a DFA for the language

$$\{w : n_a(w) \leq 3 \text{ AND } n_b(w) \equiv 2 \pmod{4}\}.$$

3. (50 points) Let  $\Sigma = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$ . We interpret strings over  $\Sigma$  as numbers in base 10. A DFA CLASSIFIER is a DFA where instead of having final states has each state is labelled, so we think of the DFA as computing a function. (If on string  $w$  you end up at state  $q$  then we think of  $w$  as being mapped to the label of  $q$ .) Write a DFA CLASSIFIER that will, on input  $w$ , tell what  $w$  is congruent to mod 6.