HW 4 CMSC 452. Morally DUE Feb 27
THIS HOMEWORK IS TWO PAGES

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

2. (40 points)

   (a) (10 points) Write a DFA for $\{a, b\}^*$. How many states does it have?

   (b) (10 points) Write a DFA for $\{a, b\}^3$. How many states does it have?

   (c) (10 points) Write a NDFA for $\{a, b\}^*\{a, b\}^3$ by using the procedure to take two DFA's and produce an NFA for the concat of the two languages. How many states does it have?

   (d) (10 points) Write a DFA for $\{a, b\}^*\{a, b\}^3$. Use the powerset construction. How many states does it have?

3. (30 points) If x is a string then x^R is that string reversed. For example $(aaab)^R = baaa$.

   If L is a language then

   $$L^R = \{w^R : w \in L\}$$

   (a) Show that if L is regular than L^R is regular.

   (b) Find a function f such that the following is true:

   (c) If L is regular via DFA M of size n then there exists a DFA for L^R with $\leq O(f(n))$ states.

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4. (30 points) Let L be the following set of infinite strings of 0's and 1's:

$$L = \{w : w \text{ has an infinite number of 1's } \}.$$

Write a DFA M such that:

If $w \in L$ then if you run M on w you will hit an accept state infinitely often.

If $w \notin L$ then if you run M on w you will hit an accept state finitely often (possibly zero).