HW 5 CMSC 452. Morally DUE Oct 7

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

2. (30 points) Read the notes on Dr. Cleaveland's lecture (they are on the class website). Using the method in the notes convert the Regular Expressions below into NFA's. Show your work so that we know you are really using the method. (DO NOT just write down the answer.)

   (a) $a^*b^* \cup b^*a^*$.

   (b) a^*bba^*.

3. (30 points) For each of the following languages either show that it is regular or show that it is not regular.

   (a) $\{a^{2n}b^{3m} \mid n, m \in N\}$

   (b) $\{a^n b^m \mid$ n is a prime and m is a prime $\}\cup$
   $\{a^n b^m \mid$ n is a prime and m is a composite $\}\cup$
   $\{a^n b^m \mid$ n is a composite and m is a prime $\}\cup$
   $\{a^n b^m \mid$ n is a composite and m is a composite$\}$

   (c) $\{a^n \mid n \leq 1000$ and n is a square $\}$

4. (40 points)

   (a) Show that the set of infinite sequences of 0's and 1's is uncountable.

   (b) Use result from part 1 to show that the set of all languages over the alphabet $\{a, b\}$ is uncountable.