HW 5 CMSC 452. Morally DUE March 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?

2. (60 points)

   (a) Show that $\{a^{2n}b^{3n} \mid n \in \mathsf{N}\}$ is not regular.

   (b) Show that $\{w \mid 3n_a(w) = 2n_b(w)\}$ is not regular.

   (c) Show that $\{a^{n^4} \mid n \in \mathsf{N}\}$ is not regular.

3. (40 points) Show that the set of all functions from the Natural to the Primes is uncountable. (HINT: Assume, by way of contradiction, that there is a LIST Of all functions from Naturals to primes: $f_1, f_2, f_3, \ldots$. YOU need to CONSTRUCT a function f from Naturals to Primes that is NOT on this list. YOU will want to define $f(i)$ so that $f(i) \neq f_i(i)$. KEY- still make sure that f goes from naturals to primes.)