CSE 322: Introduction to Formal Models in Computer Science
Assignment #4
October 25, 2006
due: Wednesday, November 1

1. Use only closure results (no pumping lemma) to prove that the language

$$A = \{0^k 1^m 2^n \mid (k = m) \vee (m = n)\}$$

over the alphabet $\Sigma = \{0, 1, 2\}$ is not regular.

2. Prove that the language $L = \{0^m 1^n \mid m \text{ is a multiple of } n\}$ over the alphabet $\Sigma = \{0, 1\}$ is not regular.

3. Problem 1.46(c) [1st Ed: Problem 1.23(d)].

4. Problem 1.53 [1st Ed: Problem 1.36]. Now you know why Assignment 1, problem 4 used such a funny representation for its arithmetic.

5. Let $P = \{a^n \mid n \text{ is a prime number}\}$ over the alphabet $\Sigma = \{a\}$. Prove that P is not regular. (Hint: the challenge is to make the right choice for i in the pumping lemma. This distinguishes this problem from most other applications of the pumping lemma.)