CSE 322: Introduction to Formal Models in Computer Science
Assignment #4
October 26, 2005
due: Friday, November 4

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. Prove that the language $L = \{wtw \mid w, t \in \{0, 1\}^* \ \& \ |t| > 0 \ \& \ |w| > 0\}$ is not regular.

5. Prove that the language

$$T \quad = \quad \{x \# y \mid x \text{ is the binary representation of } r$$

$$\& \ y \text{ is the binary representation of } q \ \& \ q = 3r\}$$

   over the alphabet $\Sigma = \{0, 1, \#\}$ is not regular. Now you know why Assignment 1, problem 6 used such a funny representation for its arithmetic.