

## CSCE 551/MATH 562, Homework 3

In Chapter 4, you can ignore everything relating to context-free languages (CFLs) or context-free grammars (CFGs).

1. Let  $M := (\{q_0, q_1, q_2, q_{acc}, q_{rej}\}, \Sigma, \Gamma, \delta, q_0, q_{acc}, q_{rej})$  be a TM, and suppose the following three IDs occur consecutively in some computation of  $M$ :

*accq<sub>0</sub>aab*

*acq<sub>1</sub>cbab*

*acaq<sub>2</sub>bab*

What are  $\delta(q_0, a)$  and  $\delta(q_1, c)$ ? What can you say about  $\Gamma$ ?

2. Exercises 3.2(d,e):

**Ex 3.2:** The exercise concerns TM  $M_1$ , whose description and state diagram appear in Example 3.9. In each of the parts, give the sequence of configurations that  $M_1$  enters when started on the indicated input string.

d. 10#11.

e. 10#10.

3. Give a formal description of a (standard, 1-tape) TM that decides the language  $L$  of all strings of the form  $w\#x$  where  $w, x \in \{0, 1\}^*$  and  $x$  has the same number of 0's as  $w$ . Give a transition diagram.