CS 580 Homework 7

Due: October 18 4:10 PM, 2023

For each of the following languages, construct a deterministic TM to recognize the language.

1. $\quad L = \{a^{2^i} | i \geq 1\}$

2. $\quad L = \{a^i b^{ij} c^j | i, j \geq 1\}$

3. $\quad L = \{a^n b^n c^n \mid n \geq 0\}$

Turing machines should be in the format required for the TM simulator at http://www.cs.binghamton.edu/~software/tm/tmdoc.html.

Requirements:

1) You should set the number of tapes to 1, the number of tracks to 1, and use a 1-way infinite tape.

2) Please put each TM in a separate text file. Name each file ⟨your last name⟩_⟨problem number⟩.txt in all lowercase, for example "chen_1.txt"

3) E-mail them to me at cchen67@vols.utk.edu by the homework deadline.

The aforementioned website provides formatting guidelines along with an example towards the end, and additional examples are included with the TM simulator. Below are the simplified instructions:

1. Install Java if needed (e.g. https://www.java.com/download/ or your Linux distro's OpenJDK package).

2. Download and unpack the tar or zip file from the TM simulator website.

3. Navigate to the "classes" directory in a terminal or DOS window.

4. Type "java TM" for the interactive program, or "java Grader" for the testing program.

After installation, the website's instructions for using the simulator are good. If you have trouble running the TM simulator on your own computer, you can run

it on the lab machines instead. You can use ssh with X forwarding to log in to the lab machines remotely and still use the simulator's GUI (see https://help.eecs. utk.edu/knowledge-base/general/remote-access/ssh for details). This simulator also offers text only version, described in web page.