

Computer Science 423
Fall 2023
Homework 9
LaTeX Examples

Answer the following for using this Turing machine for the Post Correspondence Problem (PCP):

1. [4 points] List all the δ functions for the Turing machine.
2. [4 points] Create the tiles associated with the δ functions from (a), as in Parts 2 and 3 of the PCP simulation.

$$\left[\begin{array}{c} q_0 a \\ X q_1 \end{array} \right]$$

$$\left[\begin{array}{c} a q_2 \sqcup \\ q_{accept} a \sqcup \end{array} \right]$$

3. [3 points] Create additional tiles, as in Parts 4, 5, and 6 of the PCP simulation.
4. [16 points] Run the simulation on $aabb$ until a match is achieved. Diagonal lines aligning the top substrings with the bottom replacements need not be drawn; however, place vertical bars around the main substring to be replaced in each configuration in the top line, along with vertical bars around the corresponding replacement string in each of the configurations in the bottom line. Since the strings will be quite long, write only four configurations per line.

$\# \mid q_0 a \mid a b b \# Y \mid q_0 f \mid f f \# Y f \mid q_0 f \mid f \# Y f \mid Y q_0 f \mid$

$\# q_0 a a b b \# \mid Y q_0 \mid f f f \# Y \mid f q_0 \mid f f \# Y f \mid Y q_0 \mid f$