CSCI 301 - Assignment 9, Fall 2024

Your name here

Modify the .tex source file for this document, adding your answers below each question. This is an individual assignment. See the syllabus for the collaboration policy.

1. Prove that the language $L_1 = \{ww : w \in \{0,1\}^*\}$ is not regular.

   Answer
   Write your answer here.

2. Construct a (deterministic or nondeterministic) pushdown automaton that accepts the language $L_2 = \{0^n 1^m 0^n\}$.

   Answer
   Idea: *Replace this text with an intuitive English explanation of how this machine will process strings to accept strings in L_2. Then replace the ... in each of the components below and fill in the transition table to formally specify your machine. Your table should include commentary describing the purpose of each transition rule, if it's not obvious.*

   Let $M_2 = (\Sigma, \Gamma, Q, \delta, q)$, where

   - $\Sigma = \{0, 1\}$
   - $\Gamma = \{\ldots\}$
   - $Q = \{\ldots\}$
   - $q = \ldots$, and
   - $\delta : Q \times (\Sigma \cup \Box) \times \Gamma \to Q \times \{R, N\} \times \Gamma^*$ is given in the table below:

Input	Output	Commentary
$q\Box S$	$q_1 N \epsilon$	Example transition function entry (delete this one)

3. Construct a one-tape Turing machine that accepts the language $L_3 = \{0^{2n} 1^n\}$.

   Answer
   Idea: *Replace this text with an intuitive English explanation of how this machine will process strings to accept strings in L_3. Then replace the ... in each of the components below and fill in the transition table to formally specify your machine. Your table should include commentary describing the purpose or "mode of operation" of each state, if it's not obvious.*

   Let $M_3 = (\Sigma, \Gamma, Q, \delta, q_0, q_A, q_R)$, where

   - $\Sigma = \{0, 1\}$
   - $\Gamma = \{\ldots\}$
   - $Q = \{\ldots\}$

- $q_{start} = \ldots$, and
- $q_{accept} = \ldots$, and
- $q_{reject} = \ldots$, and
- $\delta : Q \times (\Sigma \cup \Box) \times \Gamma \to Q \times \{R, N\} \times \Gamma^*$ is given in the table below:

State	**0**	**1**	$\Box$	Commentary
q_0	$q_1 \Box R$	$q_0 1 R$	$q_0 \Box R$	Example transition function entry (delete this one)