

# CPSC 354 Report

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## Abstract

This report is for the assignment hw1 of CPSC 354. With the primary goal of using git as well as LaTeX and practice. I will explain the MU puzzle explain the MU puzzle.

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## 1 Introduction

This report will expand as the semester goes on, for now it will cover homework 1

## 2 Week by Week

### 2.1 Week 1

#### Homework: The MU Puzzle

The MU puzzle is a small game made up of letters and rules. You start with the string MI. The main challenge seeing if you can turn it into the string MU

by following a few rules

1. If a string ends with I, you can add a U at the end. Example:  $MI \rightarrow MIU$ .
2. If you have a string that begins with M, you can copy everything after the M and put it again. Example:  $MIU \rightarrow MIUIU$ .
3. If you see III anywhere, you can change it into a U. Example:  $MIII \rightarrow MU$ .
4. If you see UU, you can remove it. Example:  $MUUU \rightarrow MU$ .

At first it seems like you should be able to get from MI to MU, but you can't. The reason is that the number of I's never works out in the right way. You start with one I. Using the rules, you can never get rid of all the I's. To make MU, you would need zero I's, but that is not possible.

The lesson is that even with very simple rules, there can be hidden limits on what you can do.

### 3 Conclusion

The MU puzzle shows that rules can look simple, but still create pretty deep limits. This makes it a good example on how formal systems work.