CPSC-354 Report

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Abstract

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1 Introduction

2 Week by Week

2.1 Week 1

2.1.1 Homework

Here is my work on the MU Puzzle:

$$MIU \to MIUIU \to MIUIUIU \to \cdots$$

$$MI \to MII \to MIIII \to MUI \quad \Rightarrow \quad MUI$$

$$MUI \to MUIU$$

$$MUI \to MUIU \to MUIUIU \to MUIUIUIU \to MUUIU \to MUUIUIU \to \cdots$$

$$MUIIU \to MUIIUUIU \to MUIU$$

$$MUIIU \to MUUIU \to MUIU$$

$$MUIU \to MUUIU \to MUIUIU \to MUIUIUIU \to \cdots$$

$$MUIUIUIU \to MUIUIUIUIU \to MUIUIUIUIUIU \to \cdots$$

The MU Puzzle is unsolvable because it is impossible to reach the string `MU` starting from `MI` using the given rules. After a little research and thinking on my part it is the number of `I`'s that make this impossible: rule applications can double the count, add one, or remove three at a time, however, none of these operations ever reduce the number of `I`'s to exactly zero. Since `MU` has no `I`'s, it can never be derived.

2.1.2 Questions

What rules could we add or remove in order to make this possible? I was thinking are there any ways to make this question solvable by adding only one more rule or maybe altering a rule. I think that this is an interesting question and concept.

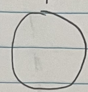
2.2 Week 2

2.2.1 Homework

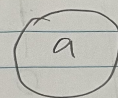
Here is my work on the Rewriting Homework:

Rewriting

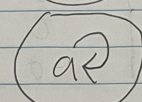
1. $A = \{\}$



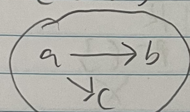
2. $A = \{a\}$ $R = \{\}$



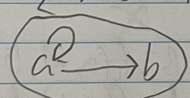
3. $A = \{a\}$ $R = \{(a,a)\}$



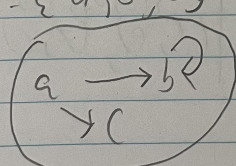
4. $A = \{a,b,c\}$ $R = \{(a,b),(a,c)\}$



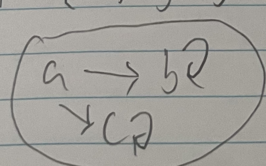
5. $A = \{a,b\}$ $R = \{(a,a),(a,b)\}$

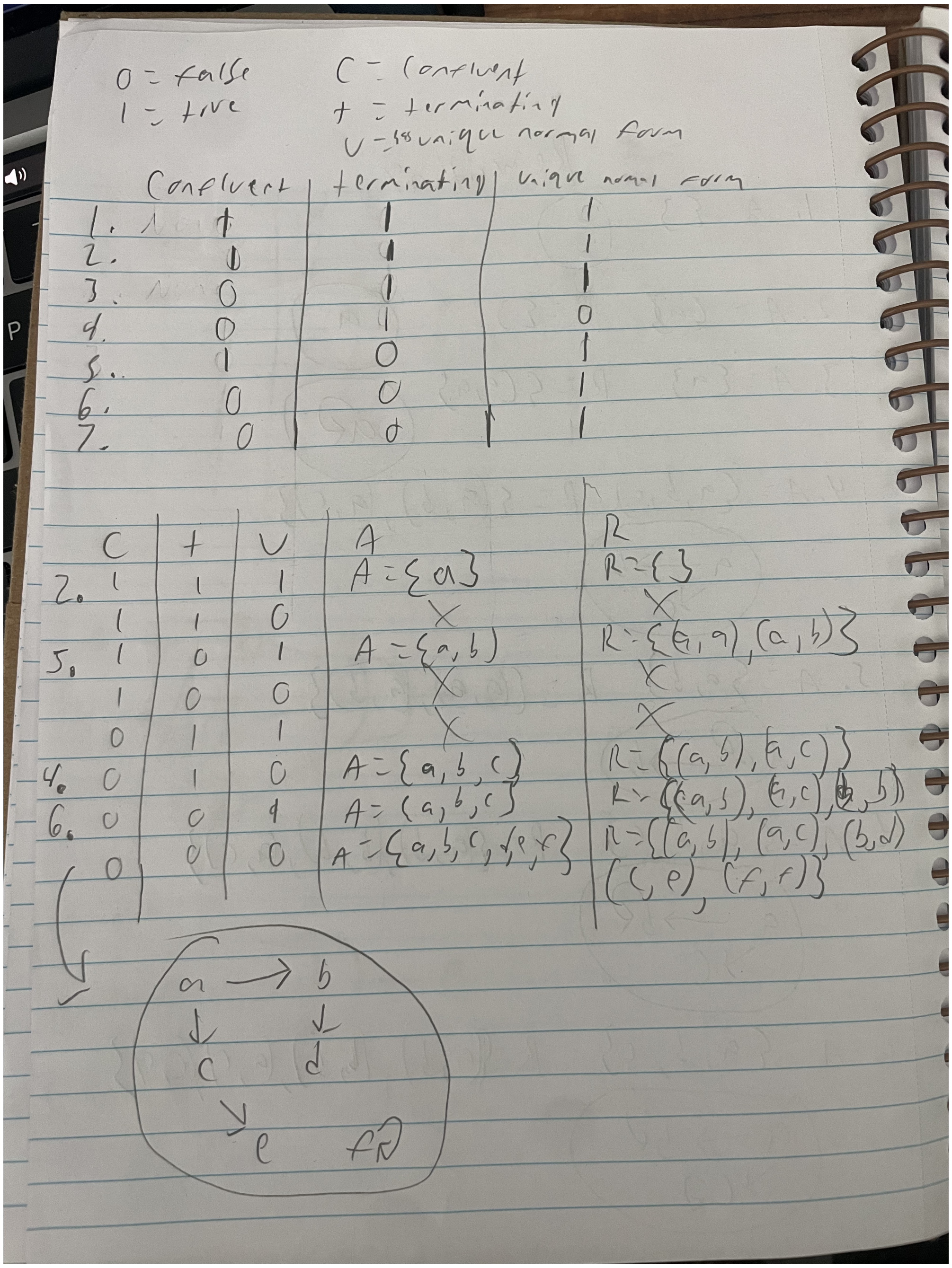


6. $A = \{a,b,c\}$ $R = \{(a,b),(b,b),(a,c)\}$



7. $A = \{a,b,c\}$ $R = \{(a,b),(b,b),(a,c),(c,c)\}$





0 = false
1 = true

C = Confluent
t = terminating
U = unique normal form

	Confluent	terminating	unique normal form
1.	1	1	1
2.	1	1	1
3.	0	1	1
4.	0	1	0
5.	1	0	1
6.	0	0	1
7.	0	0	1

	C	t	U	A	R
2.	1	1	1	A = {a}	R = { }
	1	1	0	X	X
5.	1	0	1	A = {a, b)	R = {(a, a), (a, b)}
	1	0	0	X	X
	0	1	1	X	X
4.	0	1	0	A = {a, b, c}	R = {(a, b), (a, c)}
6.	0	0	1	A = (a, b, c}	R = {(a, b), (a, c), (b, b)}
	0	0	0	A = {a, b, c, d, e, f}	R = {(a, b), (a, c), (b, d), (c, e), (f, f)}

$$\begin{tikzcd} a \arrow[r] \arrow[d] & b \arrow[d] \\ c \arrow[dr] & d \\ & e & f \arrow[loop right] \end{tikzcd}$$

2.2.2 Questions

When relating to programming, if a system is confluent but not terminating, like in some programs with infinite loops, how does confluence still guarantee that the result of a program is unique when it exists?

3 Essay

4 Evidence of Participation

5 Conclusion

References

[BLA] Author, Title, Publisher, Year.