CSC341 Lab 1A

Havin Lim / Carter English

January/27/2024

1 Problem 1

1.1

00, 11, 01

1.2

Yes, because k can be 0, and if k=0 the string has no characters

1.3

Assuming E is non-empty and finite, then we have a bijection between E* and the naturals which can be obtained by mapping each string to a number written in base $|E|$. Therefore, the cardinality is $\aleph$.

1.4

No, if the alphabet is empty E* only contains the empty string. Additionally, if the alphabet is infinite the cardinality can potentially be greater than $\aleph$.

2 Problem 2

2.1

Distinguishable = a,b
Indistinguishable = abba, baba

2.2

Distinguishable = a, ba, a, baa, b,aba
Indistinguishable = a, aab, b, bab, a,abbaba

2.3

Two strings s, t are indistinguishable if and only if the language still "works" when, for every string with a prefix of s, we replace that prefix with t. If the strings are distinguishable, then there exists a string where we have a collision and making this replacement would lose information encoded in the language.