Theory of Computation Notes

paraphrased by Tyler Wright

An important note, these notes are absolutely ***NOT*** *guaranteed to be correct, representative of the course, or rigorous. Any result of this is not the author's fault.*

Contents

1 The Basics of Computation

1.1 Decision Problems

A decision problem is a problem which has a `Yes` or `No` answer.

1.1.1 Decomposing Decision Problems

A decision problem can be decomposed into two sets, the `Yes` and `No` instances of the problem.

1.2 Alphabets

An alphabet is finite set whose members are called symbols (or equivalently letters or characters).

1.2.1 Strings

A string (or equivalently word) over an alphabet Σ is a finite sequence of symbols from Σ. The sequence may be empty, such sequences are denoted by ϵ. The amount of symbols in a string w is denoted by $|w|$.

1.2.2 The Set of Strings

The set of all strings over Σ is denoted by Σ^*.

1.2.3 Substrings and Concatenation

For two strings v, w, v is a substring of w if it appears consecutively in w.

We write vw to denotes v concatenated with w and for k in $\mathbb{Z}_{>0}$, we say v^k is the k-fold concatenation of v with itself (k copies of v).