INTRODUCTION

We mathematically model a computer/machine in general and study the theory of it

Symbol

Can be any letter or number (any character). Basic elements are called symbols.

Alphabet

Collections of symbols are called alphabets, denoted using '∑' (capital sigma)

∑ = {A, B, C ……}

(It should be **finite set** of input symbols)

String

Sequence of symbols are called strings. (abbabbba)

Strings = {a, b, ab, aba, abb, aab ……}

*Strings are not commutative (ab != ba)

*"**aabbaa**" can be expressed as **a^2b^2a^2** but can't be expressed as **a^4b^2**

Language

Collection of strings over some ∑, following by some rules

L-1) How many strings can be formed if the string length is 2, ∑ = {a, b}

= {aa, ab, ba, bb}

Total strings = | ∑ |^n

= 2 ^ 2

= 4

Finite Language

If a language has finite number of strings

The previous one was a finite language

(infinite = set of all strings where starting character is 'a' = {a, ab, aab, abb, aaa, ….})

Null string

A string whose **length is 0,** denoted using **ε** (epsilon)

|ε| = **0** (cardinality = 0)

Power of ∑

Let ∑ = {a, b}

∑^0 = set of all strings over ∑ of length 0 = {ε}

∑^1 = set of all strings over ∑ of length 1 = {a, b}

∑^2 = set of all strings over ∑ of length 2 = {aa, ab, ba, bb}

∑^* = ∑^0 ∪ ∑^1 ∪ ∑^2 ∪ ………

It is a set of all strings possible over alphabet ∑, we may call it mother of all languages. It's also called as **Klein star/ Klein closure**

L-1 ⊆ ∑^* (language 1 is subset of Klein closure)

Number of possible languages are 2^∑^* (All subsets of ∑ ^ *)