lecture 2:- PALINDROME.

- the Language Consisting of Λ & the String s defined over Σ Such that

Reverse(s) = S.

Ex: $\Sigma = \{a, b\}$.

PALINDROME = $\{\Lambda, a, b, aa, bb, \underline{a}a\underline{a}, \underline{a}b\underline{a}, \underline{b}a\underline{b}, \underline{b}b\underline{b} \ldots\}$.

How to form Palindrome Strings.

1- Length = 1
reverse(s).

2- Length > 1.
s reverse(s).
$\underbrace{ab\ ba}$

ababbaba

S = ab
S = abab

Number / Length of palindromes. $\underline{\Sigma = \{a, b\}}$.

→ Even.

2^n

$\underbrace{2\ 2\ 2 \ldots 2}_{n}$ | - - - - - - - -

$\underbrace{\qquad\qquad\qquad\qquad}_{2n}$

Length = $2n$. = 4
Number = 2^n

aa aa
ab ba
ba ab
bb bb.

HW: Find Length = 6
palindromes = ?

ODD

- ODD

$\ominus$

$- \ominus -$

$- - \ominus - -$

a

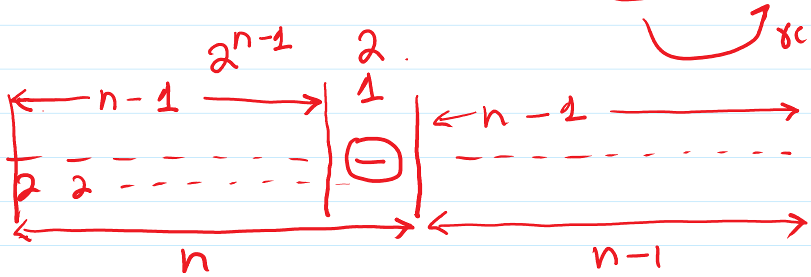
a b a

a a b a a

ab b ba

rev.

bab.



Length $= n + n-1 = 2n-1. = 5 \Rightarrow n=3.$

Number $= 2^1 \times 2^{n-1} = 2^n$

aa a aa
ab a ba
ba a ab
bb a bb.
aa b aa
ab b ba
ba b ab
bb b bb.

8.

HW:- $\Sigma = \{a,b,c\}$.

Length 6 Palindromes?

Observation:- if x is a palindrome.
Then x^n is also a palindrome.

$x = aba$. $x^5 = ?$

$x^5 = (aba)^5 =$ aba aba aba aba aba.

reverse$(x^5) =$ aba aba aba aba aba.

$= x^5$.

Kleene Star. Σ^*
is a set of collection of all strings defined over Σ
and Null.

Ex:- $\Sigma = \{x\}$.

$\Sigma^* = \{\Lambda, x, xx, xxx, xxxx, ---\}$.

$\Sigma = \{0, 1\}$.

$\Sigma^* = \{\Lambda, 0, 1, 00, 01, 10, 11, 000, ----\}$.

$\Sigma = \{aaB, c\}$

$\Sigma^* = \{\Lambda, aaB, c, aaBaaB, aaBc, caaB, cc, \cdots\}$.

Ex:- $S = \{ab, bb\}$ $T = \{ab, bb, bbbb\}$.

Show that $S^* = T^*$.

$S^* = \{\Lambda$ & all possible Combinations of Alphabets in $S\}$.

$T^* = \{\Lambda$ & " " " " " " $T\}$.

$= \{\Lambda$ & " " " " of $ab, \underline{bb}, \underline{bbbb}\}$.

Since bbbb is a Combination of bb.

$= \{\Lambda$ & " " " " of $ab, bb\}$

$= S^*$.

$T^* = S^*$.

Ex (ii) $S = \{ab, bbb\}$. $T = \{ab, bb, bbb\}$.

$S^* \neq T^*$ $S^* \subset T^*$.

$S^* = \{\Lambda$ & all possible Combination of Alphabets in S$\}$.

$T^* = \{\Lambda$ " " " " " " in T$\}$.

$= \{\Lambda$ " (ab, bb) bbb$\}$.

$S^* \neq T^*$.

$= \{(\Lambda$ " " " " of S) and S with bbb$\}$

$= \{$ S^* and S with bbb$\}$.

$S^* \subset T^*$.

Plus Operation:-

It is a set containing all possible Combinations of alphabets without Null.

Σ^+

Ex:- $\Sigma = \{x\}$ $\Sigma^+ = \{x, xx, xxx, \ldots\}$.

$\Sigma = \{0, 1\}$ $\Sigma^+ = \{0, 1, 00, 01, 10, 11, \ldots\}$.