

Kleene star

Denoted by L^* . It is the set of all strings obtained by concatenating zero or more strings from L . The concatenation of zero strings is ϵ , and the concatenation of one string is the string itself.

$$L^* = \{w \in \Sigma^* : w = w_1 \circ w_2 \circ \dots \circ w_k \text{ for some } k \geq 0 \text{ and some } w_1 \dots w_k \in L\}$$

$L = \{01, 1, 100\}$, then $110001110011 \in L^*$, since $110001110011 = 1 \circ 0 \circ 10001 \circ 0 \circ 1 \circ 0 \circ 1000 \circ 1 \circ 0 \circ 1$, and each of these strings is in L .

Note that if $\phi^* = \epsilon$ then $L^* = \epsilon$

Regular Expression

- Describes a language by means of single symbols, ϕ , \cup , parentheses and $*$.

The regular expressions over an alphabet Σ are all strings over the alphabet $\Sigma \cup \{(\,, \cup, *, \epsilon)\}$

- We use Regular Expressions as means of representing certain subsets of strings over Σ .
- Regular Expressions are used to describe languages that consist of set of strings.
- They describe languages exclusively by means of single symbols and \cup and $*$.
- They are useful for representing certain sets of string in algebraic fashion.
- Actually these describe the languages accepted by FA.
- We see $\Sigma \cup \{(\,, \cup, *, \epsilon)\}$ in Regular Expressions.
- Every regular expression represents a language.