Assignment – Week 2

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I) Give a formal definition with any notations for each of the following: Alphabet, String, Language, Concatenation of strings, Reverse of a string, Substring, Length of a string, Star-Closure of an alphabet, Positive Closure of an alphabet, Sentence of a language.

II) For a language L, describe the Complementation, and Star-Closure.

III) Describe the relationship of Language, Grammar and Automata (over a given alphabet).

IV) Write derivations for four strings of various lengths and describe what is the language generated, L(G) by the following grammar G.

$$V = \{S, A, B\}, T = \{a, b\}$$

$$P = S \rightarrow A, S \rightarrow B, B \rightarrow bB, A \rightarrow aA, A \rightarrow \lambda, B \rightarrow \lambda,$$

S is the start nonterminal.

V) Write derivations for four strings of various lengths and describe what is the language generated, L(G) by the following grammar

$$S \rightarrow aSaa|B, B \rightarrow bB|\lambda$$

VI) Write derivations for four strings of various lengths and describe what is the language generated, L(G) by the following grammar

$$S \rightarrow aSaa|B, B \rightarrow bB$$

VII) Describe the operation of Automaton as an Accepter.

VIII) Let

$$\sum = \{a, b\}$$
$$L_1 = \{a, ab, abb\}$$
$$L_2 = \{\lambda, b, bb\}$$

Describe all the following languages as a set of strings.

1) $L_3 = L_1 \cap L_2$
2) $L_1 L_3$
3) $L_3 L_1$
4) $L_1 L_2$
5) $L1\emptyset$
6) L_1^R
7) L_2^R
8) $\underline{\sum}^*$
9) $\overline{L_2}$
10) L_1^0
11) L_1^1
12) L_1^2
13) L_2^2