

Program: BSCS (Even)

Subject: Theory of Automata

Instructor: Mustafa Ali Bamboat

Assignment – 1

Due Date: 03-Oct-2023 (3rd Week)

Q1. Explain below statements in aspect of Kleene Star Closure:

- i. Let $S=\{ab, bb\}$ and $T=\{ab, bb, bbbb\}$ Show that $S^* = T^*$ [Hint $S^* \subseteq T^*$ and $T^* \subseteq S^*$]
- ii. Let $S=\{ab, bb\}$ and $T=\{ab, bb, bbb\}$ Show that $S^* \neq T^*$ But $S^* \subset T^*$
- iii. Let $S=\{a, bb, bab, abaab\}$ be a set of strings. Are $abbabaabab$ and $baabbbabbaabb$ in S^* ? Does any word in S^* have odd number of b's?

[3 Marks]

Q2. Explain below statements in aspect of Kleene Plus Operation:

1. Is there any case when S^+ contains Λ ? If yes then justify your answer.
2. Prove that for any set of strings S

- i. $(S^+)^+ = S^+$
- ii. $(S^*)^+ = (S^+)^*$
- iii. $(S^+)^* = (S^*)^+$

[3 Marks]

Q3. Define Language over the given regular expressions:

- i. Consider the language, defined over $\Sigma=\{a, b\}$ of words beginning with **a**, then its regular expression may be? and also show with explain string
- ii. Consider the language, defined over $\Sigma=\{a, b\}$ of words beginning and ending in same letter, then its regular expression may be? and also show with explain string
- iii.
- iv. Consider the language, defined over $\Sigma=\{a, b\}$ of words ending in b, then its regular expression may be? and also show with explain string
- v. Consider the language, defined over $\Sigma=\{a, b\}$ of words not ending in a, then its regular expression may be? and also show with explain string

[4 Marks]