

Homework 1

Nikhil Unni (nunni2)

1. I'll be inducting on the number of operations to construct a regular language.

Base Case:

The base case is when the number of operations to construct the regular language is $n = 1$. The only way to get a regular language of a single operation is through the base case of the inductive definition of regular languages:

- \emptyset is represented by a top-plus regular expression, of the form $(\alpha_1 + \dots + \alpha_k)$, where $k = 1$, because $\alpha_1 = \emptyset$ contains no '+'
- $\{\epsilon\}$, is also represented by a top-plus expression, again where $k = 1$, where $\alpha_1 = \epsilon$ contains no '+'.
- $\{a\}$, for any a in any arbitrary alphabet, Σ , is represented by a top-plus expression, where $k = 1$, where $\alpha_1 = a$ contains no '+'

Inductive Hypothesis:

Now assume for all regular languages, where the number of operations to construct is $1 \leq k < n$, that they can be represented by a top-plus regular expression.

Inductive Step:

We know that