CS 3530: Assignment 2e

Fall 2023

Problem 2.44 (20 points)

Problem

If A and B are languages, define $A \diamond B = \{xy : x \in A \text{ and } y \in B \text{ and } |x| = |y|\}$. Show that if A and B are regular languages, then $A \diamond B$ is a CFL.

Note: a formal proof is not necessary; a detailed description of a suitable construction and an informal argument will suffice.

Solution

The strings generated by $A \diamond B$ are concatenations of strings of equal length generated by languages A and B respectively. From the start state push a marker onto the stack to mark the bottom. Then for each character from A you will push a 1 onto the stack. Then while going thru B you will pop 1 from the stack for every character. This method does not accept unless A and B are of the same length, which will be known only if the stack marker is seen at the end of both strings.