CS 374 Lab 21: Decidability, Recursive Enumerability, and Closure Properties

Date: April 11, 2018.

Problem 1. [Category: Design+Proof] Prove that the recursive languages are closed under the following operations:

- union
- intersection
- complement
- concatenation

Problem 2. [Category: Design+Proof] Prove that if L_1 and L_2 are recursive, then so is $\text{SHUFFLE}(L_1, L_2) = \{w \mid w = \alpha_1\beta_1\alpha_2\beta_2 \dots \alpha_k\beta_k$ for some $k \geq 0$ and strings $\alpha_1, \dots, \alpha_k$ and $\beta_1, \dots \beta_k$, such that $\alpha_1\alpha_2 \cdots \alpha_k \in L_1$ and $\beta_1\beta_2 \cdots \beta_k \in L_2\}$.

Problem 3. [Category: Design+Proof] Show that if L_1 and L_2 are recursively enumerable, then so is $\text{SHUFFLE}(L_1, L_2)$.