Lecture 15 - Some examples of regular sets.

Let $A, B \subseteq \Sigma^*$. Let

$$\text{Shuffle-1}(A,B) = \{ w \mid w = a_1 b_1 \cdots a_k b_k \text{ where } a_1 a_2 \cdots a_k \in A \text{ and } b_1 b_2 \cdots b_k \in B \text{ and } \forall i,\ a_i b_i \in \Sigma \}.$$

Claim 1. if A and B are regular then Shuffle-1(A,B) is regular.

$$\text{Shuffle-2}(A,B) = \{ w \mid w = a_1 b_1 \cdots a_k b_k \text{ where } a_1 a_2 \cdots a_k \in A \text{ and } b_1 b_2 \cdots b_k \in B \text{ and } \forall i,\ a_i b_i \in \Sigma^* \}$$

Claim 2. if A and B are regular then Shuffle-2(A,B) is regular.

For $A \subseteq \Sigma^*$ let $\text{cycle}(A) = \{ yx \mid xy \in L \}$.

claim. if A is regular then cycle(A) regular