

Closure properties of Regular Languages

Regular languages are closed under

- Union
- Intersection
- Set Difference
- Concatenation
- Kleene Closure
- Reversal
- Homomorphism
- Inverse Homomorphism

♠ If a language is not regular then neither is its complement :)

♠ Considering Σ, Γ as two alphabets, a function $h : \Sigma \mapsto \Gamma^*$ is a homomorphism iff

$\forall \sigma_1, \dots, \sigma_n \in \Sigma, \quad h(\sigma_1 \cdots \sigma_n) = h(\sigma_1) \cdots h(\sigma_n)$. Now, if $L \subseteq \Sigma^*$ is regular then so is $h(L)$. Similarly, if $L \subseteq \Gamma^*$ is regular then so is $h^{-1}(L)$.