

Automata & Formal Languages

Homework 3 – Closure Properties of Regular Languages

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1. (a) The language $\mathcal{L} = \mathcal{L}_1 \cap \mathcal{L}_2 \cap \dots \cap \mathcal{L}_n$, where every \mathcal{L}_i is a regular language, is regular, since intersection is closed under finite intersection.
- (b) The language $\mathcal{L} = \mathcal{L}_1 \cap \mathcal{L}_2 \cap \dots$, where every \mathcal{L}_i is a regular language, is not regular, since intersection is not closed under infinite intersection.
- (c) If a language \mathcal{R} is regular, and for some language \mathcal{L} , $\mathcal{L} - \mathcal{R}$ is regular, then \mathcal{L} is regular. This is because $\mathcal{L} = (\mathcal{L} - \mathcal{R}) \cup \mathcal{R}$, and regular languages are closed under finite union.
- (d)