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Dept. of Computer Science
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Theoretical Computer Science - Bridging Course
Exercise Sheet 6

Due: Tuesday, 3rd of December 2024, 12:00 pm

Exercise 1: Decidable Problems *(2+2 +2+2 Points)*

Show that the following languages are decidable.

1. $A = \{\langle R, S\rangle \mid R \text{ and } S \text{ are regular expressions and } L(R) \subseteq L(S)\}$.
2. Let $B = \{\langle G\rangle \mid G \text{ is a CFG over } \{0,1\} \text{ and } 1^* \cap L(G) \neq \phi\}$. Use the fact that a language $C \cap R$ is context free for some context free language C and regular language R.
3. Consider a decidable language L. Show that its complement $\bar{L}$ is also decidable.
4. Show that there is a language that is Turing-Recognizable but not Turing-Decidable using the result above.