COMPUTABILITY AND COMPLEXITY

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Abstract. One of the most critical question about a problem in computer science is whether we are capable of solving it or even worse whether this problem admits a solution or not. The theories of computability and complexity, which are introduced in this module, have been developed in order to render such questions precise and to discuss them. In complexity theory, the objective is to classify problems as easy and hard ones, whereas in computability theory, problems are classified as solvable and non-solvable ones. In addition, computability theory introduces several of the concepts used in complexity theory. Therefore, this module proposes the integrated study of specific basic issues in both computability and complexity theory, such as the Church-Turing thesis, decidability and reducibility, time and space complexity classes, determinism and non-determinism, hierarchy theorems and polynomial classes (P, NP, PSPACE, etc.), completeness and basic NP-hard problems.

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