What can computers do in principle? What are their inherent theoretical limitations? These are questions to which computer scientists must address themselves. The theoretical framework which enables such questions to be answered has been developed over the last fifty years from the idea of a computable function: intuitively a function whose values can be calculated in an effective or automatic way. This book is an introduction to computability theory (or recursion theory as it is traditionally known to mathematicians). Dr Cutland begins with a mathematical characterisation of computable functions using a simple idealised computer (a register machine); after some comparison with other characterisations, he develops the mathematical theory, including a full discussion of non-computability and undecidability, and the theory of recursive and recursively enumerable sets. The later chapters provide an introduction to more advanced topics such as Godel's incompleteness theorem, degrees of unsolvability, the Recursion theorems and the theory of complexity of computation. Computability is thus a branch of mathematics which is of relevance also to computer scientists and philosophers. Mathematics students with no prior knowledge of the subject and computer science students who wish to supplement their practical expertise with some theoretical background will find this book of use and interest.

My Personal Review:
Cutland's book "Computability: An Introduction to Recursive Function Theory" is without doubt the best introduction to recursion theory available on the market. Elementary Recursion Theory is a logician's expression for theoretical computer science, with an emphasis on negative results, i.e. what computers cannot do. Cutland could have exploited Church's Thesis in the manner of H. Rogers, and this could have perhaps make the book readable for a larger public from the human science. Instead Cutland
defines the computable functions in a rather standard way through the use of the Register Machine. Then all the basic chapters of recursion theory are introduced, including a gentle explanation of Kleene second recursion theorem, on recursive operators, on formal arithmetic and Godel's incompleteness theorem, Post creative and productive sets. It contains a chapter on Blum complexity theory, with the gap theorem and Blum's speed-up theorem. The book is a must for those who want to penetrate this fundamental subject.

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