7. Proving an algorithm correctness

- Correctness has to be proved for every algorithm.

- To prove that the algorithm yields a required result for every legitimate input in a finite amount of time.

- A proof of correctness requires that the solution to be stated in two forms : **Assertions** that deals about input and output variables of the program and **Specifications** that is expressed in predicate calculus.

Proving Algorithm Correctness People

Marcel A. Müller

Proving Algorithm Correctness People:

An Introduction To The Analysis Of Algorithms Michael Soltys-kulinicz,2009-10-14 This textbook covers the mathematical foundations of the analysis of algorithms The gist of the book is how to argue without the burden of excessive formalism that a given algorithm does what it is supposed to do The two key ideas of the proof of correctness induction and invariance are employed in the framework of pre post conditions and loop invariants The algorithms considered are the basic and traditional algorithms of computer science such as Greedy Dynamic and Divide and Online algorithms which are essential in fields as diverse as operating systems caching in particular and stock market predictions This self contained book is intended for undergraduate students in computer science and mathematics   **An Introduction to the Analysis of Algorithms** Michael Soltys,2012 A successor to the first edition this updated and revised book is a great companion guide for students and engineers alike specifically software engineers who design reliable code While succinct this edition is mathematically rigorous covering the foundations of both computer scientists and mathematicians with interest in algorithms Besides covering the traditional algorithms of Computer Science such as Greedy Dynamic Programming and Divide Conquer this edition goes further by exploring two classes of algorithms that are often overlooked Randomised and Online algorithms OCo with emphasis placed on the algorithm itself The coverage of both fields are timely as the ubiquity of Randomised algorithms are expressed through the emergence of cryptography while Online algorithms are essential in numerous fields as diverse as operating systems and stock market predictions While being relatively short to ensure the essentiality of content a strong focus has been placed on self containment introducing the idea of pre post conditions and loop invariants to readers of all backgrounds Containing programming exercises in Python solutions will also be placed on the book s website   **Algorithms: A Top-down Approach** Rodney R Howell,2023-01-04 This comprehensive compendium provides a rigorous framework to tackle the daunting challenges of designing correct and efficient algorithms It gives a uniform approach to the design analysis optimization and verification of algorithms The volume also provides essential tools to understand algorithms and their associated data structures This useful reference text describes a way of thinking that eases the task of proving algorithm correctness Working through a proof of correctness reveals an algorithm s subtleties in a way that a typical description does not Algorithm analysis is presented using careful definitions that make the analyses mathematically rigorous Related Link s   **Introduction To The Analysis Of Algorithms, An (2nd Edition)** Michael Soltys-kulinicz,2012-07-17 A successor to the first edition this updated and revised book is a great companion guide for students and engineers alike specifically software engineers who design reliable code While succinct this edition is mathematically rigorous covering the foundations of both computer scientists and mathematicians with interest in algorithms Besides covering the traditional algorithms of Computer Science such as Greedy Dynamic Programming and Divide Conquer this edition goes further by exploring two classes of algorithms that are often overlooked Randomised and Online algorithms with emphasis placed on

the algorithm itself The coverage of both fields are timely as the ubiquity of Randomised algorithms are expressed through the emergence of cryptography while Online algorithms are essential in numerous fields as diverse as operating systems and stock market predictions While being relatively short to ensure the essentiality of content a strong focus has been placed on self containment introducing the idea of pre post conditions and loop invariants to readers of all backgrounds Containing programming exercises in Python solutions will also be placed on the book s website   Discrete Algorithmic Mathematics Stephen B. Maurer,Anthony Ralston,2005-01-21 Thoroughly revised for a one semester course this well known and highly regarded book is an outstanding text for undergraduate discrete mathematics It has been updated with new or extended discussions of order notation generating functions chaos aspects of statistics and computational biology Written in a lively clear style the book is unique in its emphasis on algorithmics and the inductive and recursive paradigms as central mathematical themes It includes a broad variety of applications not just to mathematics and computer science but to natural and social science as well   *Logic, Language, Formalism, Informalism* Daniel Richardson,1995 To clarify the understanding of reasoning systems that underpin much computing theory this text criticizes and challenges the results of formalization with the language of PROLOG It analyzes the process of formalization setting out to explain proof and reasoning

Introduction to Computing V. A. Dyck,John Douglas Lawson,J. A. Smith,1979   *A Proof Environment for Arithmetic with the Omega Rule* Siani L. Baker,Alan Smaill,University of Edinburgh. Department of Artificial Intelligence,1993 Abstract An important technique for investigating derivability in formal systems of arithmetic has been to embed such systems into semi formal systems with the omega rule This paper exploits this notion within the domain of automated theorem proving and discusses the implementation of such a proof environment namely the CORE system which implements a version of the primitive recursive omega rule This involves providing an appropriate representation for infinite proofs and a means of verifying properties of such objects By means of the CORE system from a finite number of instances a conjecture for a proof of the universally quantified formula is automatically derived by an inductive inference algorithm and checked for correctness In addition candidates for cut formulae may be generated by an explanation based learning algorithm This is an alternative approach to reasoning about inductively defined domains from traditional structural induction which may sometimes be more intuitive   **Systems Construction and Analysis** Norman E. Fenton,Gillian Hill,1993 This text provides the discrete mathematics needed as a rigorous foundation for the construction and analysis of application systems Construction involves development within formal linguistic systems and analysis involves external assessment and measurement The foundation provided by this book allows for many applications to be discussed in detail A gentle introduction to discrete mathematics and formal systems allows a gradual pace of learning for the student and examines ideas before giving a serious exposition of mathematical logic that emphasizes the link between theories in formal languages and their models The major programming paradigms are linked to approaches to specification and verified by the axiomatic

method   Proceedings of the Seventh Annual ACM Symposium on Principles of Distributed Computing ,1988
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with C++ Frank M. Carrano,Janet J. Prichard,2005 Designed for a second course in computer science this textbook
introduces the data abstraction technique for building walls between a program and its data structures and presents various
abstract data types and their implementations as C classes The author evaluates the advantages and disadvantages of array
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