



# How to Think About Analysis

By Lara Alcock

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## How to Think About Analysis By Lara Alcock

Analysis (sometimes called Real Analysis or Advanced Calculus) is a core subject in most undergraduate mathematics degrees. It is elegant, clever and rewarding to learn, but it is hard. Even the best students find it challenging, and those who are unprepared often find it incomprehensible at first. This book aims to ensure that no student need be unprepared. It is not like other Analysis books. It is not a textbook containing standard content. Rather, it is designed to be read before arriving at university and/or before starting an Analysis course, or as a companion text once a course is begun. It provides a friendly and readable introduction to the subject by building on the student's existing understanding of six key topics: sequences, series, continuity, differentiability, integrability and the real numbers. It explains how mathematicians develop and use sophisticated formal versions of these ideas, and provides a detailed introduction to the central definitions, theorems and proofs, pointing out typical areas of difficulty and confusion and explaining how to overcome these.

The book also provides study advice focused on the skills that students need if they are to build on this introduction and learn successfully in their own Analysis courses: it explains how to understand definitions, theorems and proofs by relating them to examples and diagrams, how to think productively about proofs, and how theories are taught in lectures and books on advanced mathematics. It also offers practical guidance on strategies for effective study planning. The advice throughout is research based and is presented in an engaging style that will be accessible to students who are new to advanced abstract mathematics.

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#### Review

"This book is an invaluable guide for any undergraduate student taking Analysis... It is written using a friendly and informal tone yet carefully emphasizes and demonstrates the importance of paying attention to the details. It is an excellent read and is highly recommended for anyone interested in Analysis or any area of pure mathematics." --*MAA Reviews*

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"*How to Think about Analysis* [is] a very effective and helpful book, a book which should be on every undergraduate reading list and should be available to potential mathematics undergraduates in schools."  
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"*How to Think about Analysis* offers several insights into the best practices to use when studying upper-level mathematics. Not only are these insights helpful to students, but they could also prove helpful to teachers of earlier courses; modifying and incorporating some of these practices into earlier courses may better prepare their students for future mathematics coursework." --*Mathematics Teacher*

#### About the Author

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Lara Alcock is a Senior Lecturer in the Mathematics Education Centre at Loughborough University. She studied Mathematics to Masters level at the University of Warwick before going on to doctoral study in Mathematics Education at the same Institution. She spent four years as an Assistant Professor in Mathematics at the Graduate School of Education at Rutgers University in the USA, and two as a Teaching Fellow in Mathematics at the University of Essex in the UK before taking up her present position. In her current position she teaches undergraduate Mathematics, works with PhD students in Mathematics Education, and conducts research studies on the ways in which people learn, understand and think about abstract mathematics. She has been awarded National Teaching Fellows of 2015 by The Higher Education Academy.

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