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Book review: *"Mathematical Analysis for Sciences and Engineering: Analysis of Sequences, Numerical Series, Mathematical Functions, Asymptotic Analysis"*

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Mathematical Analysis for Sciences and Engineering: Analysis of Sequences, Numerical Series, Mathematical Functions, Asymptotic Analysis
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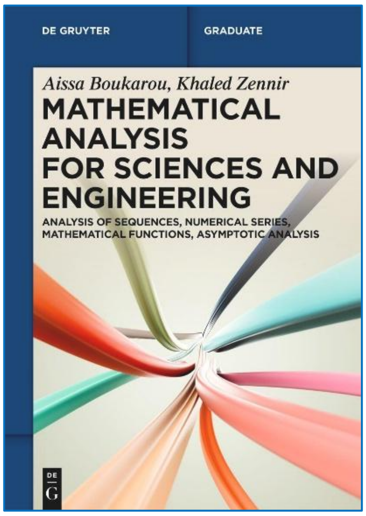

The publisher states that this book is designed for graduate students in mathematics, though I would say that it would also be very useful for undergraduate students in advanced Capstone units in discrete mathematics as it contains many pertinent projects for such students, as well as fundamental revision of the main undergraduate units of study. The bibliography also mentions some excellent texts for teaching and learning at advanced undergraduate and early postgraduate levels.

The book is attractively produced with a wealth of examples (in grey) and exercises (in blue) with some historical footnotes. In particular, for readers of this journal, Chapters 3,4 and 6 focus respectively on sequences, series and functions. All the chapters are in turn as follows:

1. Properties of the set $\mathbb{R}$.
2. Complex Numbers $\mathbb{C}$.
3. Sequences of real numbers,
4. Numerical Series.
5. Functions of one real variable.
6. Usual Functions.
7. Asymptotic Analysis.

There are also three sections with Solutions, Bibliography, Index.

The development of theory is sequential with clarity of explanations and richness of examples and exercises. Those of the latter which this reviewer checked were correct and apt illustrations of the pertinent theory. For example, Exercise 3.24 (Part 3) in "Section 3.11 Recursive Sequences" is:

> Let u_0 and v_0 be two real numbers such that $0 < u_0 < v_0$. We define the sequences $(u_n)_{n\in\mathbb{N}_0}$ and $(v_n)_{n\in\mathbb{N}_0}$ by $u_{n+1} = \dfrac{2u_n v_n}{u_n + v_n}$ and $v_{n+1} = \dfrac{u_n + v_n}{2}$. Deduce that the sequences $(u_n)_{n\in\mathbb{N}_0}$ and $(v_n)_{n\in\mathbb{N}_0}$ converge to the same limit. What is this limit?

As indicated above, this book is comprehensive with concise and precise explanations for clear understanding by undergraduate honours students enrolled in a capstone unit because it builds on the scaffolding of all undergraduate units, and/or by graduate students enrolled in a Master's degree by course work with a major written report, as there are many exercises which are suitable for more extended explanation, such as power, reciprocal and inverse functions [1, 2], as well as the use of asymptotic proofs for interesting and challenging "nearly all" results, in what is a rigorous development of the asymptotic study of functions [3].

Finally, for readers of this journal and their students and colleagues, there is a wealth of analyses of well-known sequences and standard series. The partial solutions alone occupy 118 pages, and they require much dedication and self-reliant learning techniques from interested students.

References

[1] Alladi, K. (1975). A Farey sequence of Fibonacci numbers. *The Fibonacci Quarterly*, 13(1), 1–10.

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[3] Shannon, A. G. (1984). Some asymptotic properties of generalized Fibonacci numbers. *The Fibonacci Quarterly*, 22(3), 239–243.