atmosphere. A more elegant (and cheaper) solution has been found by Labeyrie." This cheap solution depends, of course, on a clever use of the Fourier transform.

There are many such gems scattered throughout the book. It really is fun to read, spoiled only by a number of misprints. It's such a pity they were not corrected for this new printing, but they cannot prevent Körner's enthusiasm infecting the reader. I liked how he always keeps the reader in mind. For instance he prefaces a routine proof with the remark "It is not very interesting and I suggest the reader just skims through it." On the other hand after presenting a handwaving argument deducing the inversion formula for Fourier integrals by analogy with Fourier series he says "the reader should spend half an hour trying to make this rigorous. Even if she does not succeed she will benefit from the experience. If she does succeed she is probably wasting her time reading this book."

I disagree with the last sentence. I think such a reader would revel in this book, and time you enjoy wasting is not wasted time. Terence Tao (no less) says in the forward to this new printing that he 'spent many pleasant hours as a graduate student browsing through whatever topics took my fancy…the history of the transatlantic cable, or the use of Fourier analytic ideas to locate primes in arithmetic progression…or to estimate the age of the earth.'

I cannot imagine a mathematically prepared reader failing to enjoy this book.

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Game theory basics by Bernhard von Stengel, pp 374, £34.99 (paper), ISBN 978-1-10882-423-1, Cambridge University Press (2021).

Game theory has been increasingly popular amongst economists and political scientists in recent years, but in focusing so much on the applications there is a risk of losing sight of the firm mathematical foundations upon which the theory is built. Bernhard von Stengel's textbook aims to address this by explaining the basics of game theory with clarity and rigour, prioritising mathematical precision over extensive real world examples. The book is written for undergraduates in mathematics, computer science and mathematical economics, either for self-study or as the text for a university course. It aims to cover everything a game theorist should know, including several ideas that are often omitted from other introductory textbooks, such as combinatorial games, congestion games and correlated equilibria. It is also notable for being almost entirely self-contained, and while many sections would be challenging without a reasonable degree of familiarity with linear algebra, probability theory and analysis, all of the relevant concepts are defined and explained *in situ*, from relatively basic concepts (such as matrix multiplication or the expected value of discrete random variables) up to an entire chapter dedicated to proving Brouwer's fixed-point theorem.

The author's experience and expertise as a lecturer in mathematical game theory is readily apparent at the start of every chapter, with concise, motivating introductions followed by clear and informative descriptions of the prerequisites and learning outcomes. The material itself is extremely well explained, with numerous illustrative examples included alongside the abstract definitions and proofs. I also appreciated the occasional injection of dry humour, such as the complaint about the ambiguity of the phrase 'next Friday' in the very first chapter, and the author's personality manages to shine through the text without affecting the clarity of the

exposition. It was occasionally challenging to stay engaged in some of the denser parts of the textbook, with the chapters on expected utility and bargaining feeling especially slow at times, but such sections are inevitable when you are aiming for this level of mathematical rigour. Certainly the overall balance of content is excellent, and I have no doubt that the majority of the intended audience would find this a very entertaining and informative introduction to the subject.

I do, however, have a few small complaints, particularly as a resource for self-study. The first is rather trivial; while the cover art is pleasingly whimsical and neatly relates to one of the worked examples used in the textbook, the cartoonish appearance does slightly undermine the sophistication of the contents! The second is that, while each chapter ends with a thoughtfully curated set of exercises, the solutions are not included. As indicated in the preface, they are only available on request to registered lecturers. As a reviewer I managed to access a set fairly easily and they were expertly written, but although some lecturers will prefer this approach, it could be a problem for anyone hoping to use this textbook independently.

My final complaint relates to the placement of the chapter on Brouwer's fixed-point theorem. It should be emphasised that this is one of the highlights of the textbook and is fantastically well-presented, ensuring that anyone with sufficient mathematical skills will be able to follow every step of the proof with minimal prerequisites. However, it is undeniable that this chapter feels unlike any other in the book, and in particular it has no game theoretic context whatsoever. For mathematicians this section satisfyingly plugs the gap in the proof of the existence of Nash equilibria presented in the previous chapter and I completely understand its inclusion. However, I feel that its placement at the centre of the book gives it a misplaced sense of importance. The author states that it is included for reference only and can be omitted entirely from courses that place less emphasis on mathematical proofs, but for those using the textbook for self-study, especially economists and political scientists, it could present quite a formidable hurdle. Subsequent chapters include such important topics as zero-sum games and game trees with imperfect information and there is a risk that these may end up being missed. I worry that many independent learners would assume that these later chapters will build on some of the techniques and material covered in this chapter, and thus could be dissuaded from attempting them, while the only real application comes before this point in the textbook and the later sections rely once again on more standard game theoretic approaches. To be fair, this is all clearly explained in the preface, and as previously mentioned the chapter introductions detail the actual prerequisites for each topic, but without the guiding hand of a university course this placement interrupts the otherwise excellent flow of the book.

Overall, however, these are minor flaws in an otherwise masterfully constructed introduction to game theory. It provides an expertly rigorous foundation in the subject and also a concise introduction to many of the more interesting and advanced techniques currently being studied. There are plenty of useful references for those either looking to explore more concrete applications of the theory or keen on digging further into the underlying mathematics, and whichever path you choose to follow this textbook will give you all the tools required to succeed.

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