
Article:
Applebaum, D. (2018) Introductory topology, exercises and solutions by Mohammed Hichem Mortad, pp. 356, £40, (paper), ISBN 978-9-81314-802-4, World Scientific (2017). The Mathematical Gazette, 102 (553). pp. 185-186. ISSN 0025-5572

https://doi.org/10.1017/mag.2018.38

Review of *"Introductory Topology: Exercises and Solutions (second edition)"*, **by M.H.Mortad (World Scientific) (2017) pp. 356 (paperback, £40), ISBN: 978-981-3148-02-4**

Topology is one of the key themes of modern pure mathematics, and an introductory course in point–set (i.e. general) topology is frequently taught at level 3/4 of a BSc/MMath degree in the UK, or as a graduate course in the USA. The book under review is not a traditional textbook, but more a companion to such, with its main focus being problem solving through the provision of a large number of exercises, many of which are solved by the author. The first part of the book (roughly half of it) comprises eight chapters covering background set theory, metric spaces, topological spaces, continuity and convergence, compact spaces, connected spaces, complete metric spaces and function spaces. Each chapter gives a brief account of the topic in question, but without a full mathematical development; so e.g. theorems are stated but not proved. The typical reader will have encountered the full theoretical development elsewhere (e.g. in lectures or from a standard text), and will use this material as an aide memoire for tackling the exercises. Each of these chapters concludes with a collection of four different types of exercise: true or false questions, exercises with solutions, test questions and further (more challenging) exercises. The second part of the book is devoted to providing fully worked solutions to the first two of these, and hints for the third.

The book is well written, and there is a welcome breadth in the choice of topics. For example, the contraction mapping theorem is a standard topic in metric space theory and it rightly features in Chapter 7. I appreciated the way that the author used this as a springboard for an introduction to integral equations, which interested readers can then follow up in one or more of the references provided. To give some sense of the number and type of exercises, chapter 5 on compactness has 24 true/false questions (e.g. is it true that the closed unit ball is always compact?), 40 exercises with solution (e.g. prove that a closed subset of a compact space is compact), 11 test questions (e.g. is a finite subset of a compact set always sequentially compact?) and 18 further exercises (e.g. show that every compact Hausdorff space is normal). The solutions are very clearly and carefully worked out. My only complaint on this part is that some of the "hints" for the test questions are somewhat brusque and unhelpful, e.g. "Well, do it...!", or for the example given above, "Fairly simple...".

I think this book is a valuable resource. Since it is now in a second edition, it has clearly been popular. Students who meticulously work through all the problems in the book in an intelligent way (i.e. don't look at the solution until you've done the problem), will surely gain considerable insight into the subject; teachers who don't tell their students about it will find it a valuable source for exam questions.

Dave Applebaum (University of Sheffield)