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Book reviews

Tom Richmond, General topology. An introduction, de Gruyter, 2020,
ISBN 978-3-11-068656-2/pbk; 978-3-11-068657-9/ebook, xi + 314 pages.

The specific feature of this introductory text on general topology is the insistence on the relations between topology and order, with emphasis on the so called asymmetric topologies, meaning topologies in the non T_1 setting. Since the only T_1 topology on a finite set is the discrete one, studies in computer science, where one works with finite sets of points (pixels), require the use of non T_1 topologies. The specialization order on a topological space (X, τ) is defined by $x \leq_\tau y$ if $x \in \mathrm{cl}\,\{y\}$. Since in a T_1 space it becomes the equality relation, it is relevant only in non T_1 setting. Actually, there exists a bijective correspondence between quasi-orders (reflexive and transitive relations) and topologies, done through the Alexandroff topologies, meaning topologies for which the intersection of an arbitrary family of open sets is open. All these are presented in the second part of the book, Chapters 8 to 10. In Ch. 11 one discusses some typical examples of asymmetric topologies given by extended distances – pseudometrics, quasi-metrics (the symmetry of the distance is broken), partial-metrics (it is possible that $d(x, x) > 0$ for some x). Uniform spaces are discussed in Chapter 12, including a brief presentation of quasi-uniform spaces, the asymmetric analogs of uniform spaces, where the opposite U^{-1} of an entourage U is not necessarily an entourage. The last chapter of the book, Chapter 13. *Continuous deformation of sets and curves*, contains a quick introduction to some topics in algebraic topology, laying the groundwork for further study in this area.

The first chapter, Chapter 0. *Preliminaries*, contains some notions and results from set theory, logic and ordered sets. Chapters 1 to 7 provide an introduction to classical general topology, culminating with connectedness, separation axioms and compactness (Tychonoff theorem), the presentation being based on motivation by examples and intuition. For instance, the quotient topology is exemplified on the circle obtained by the identification of the endpoints of a segment, the cylinder and the Möbius strip obtained in a similar way from a rectangle and the torus from a cylinder.

Another specific of the book is the rich supply of exercises (over than 740) spread through the book, completing the main text with further examples and applications as well as suggesting areas for continued investigation.

This is a well written introductory course on general topology. The numerous examples (illustrated by figures) and the intuitive approach adopted by the author makes it appealing to students in mathematics and related areas. Students in computer science will find a carefully motivated presentation of some topics in asymmetric topology (tightly connected with discrete mathematics) they may encounter in their study.

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