The fascinating world of graph theory enjamin, G. Chartrand, P. Zhang. Princeton University Press, Princeton (2015). xi+322 pages. Hardcover, ISBN 978-069116381-9 (hbk), GBP 19.95. `f = r599`

This is a textbook introduction to graph theory, but not in the conventional sense. It is the conviction of the authors that mathematics should be fun and the fun is more in the search for the result, rather than in the result itself. Moreover, what is taught today are not results that have always been there. They were found by humans, sometimes not even mathematicians, who were curious at some point and found out about them, sometimes for no particular reason and sometimes with a specific application in mind.

The authors find such background also important to communicate to students so that theorems are not remote abstract artificial entities to be assimilated with aversion. Thus this course also contains a lot of historical background about the people who obtained the results, sometimes with extensive biographical stories of how and why they found it. Furthermore the applications are often puzzles to be solved like for example the stereotypical bridges of Knigsberg the knight's tour and the four color problem. But there are also more modern problems such as job hunting or trafic and tournament organization. So the purpose of a theorem is not just to be able to prove another theorem but they solve actual problems. On the other hand, it is still a textbook, so there are theorems and proofs. And there are exercises that are grouped per chapter at the end of the book.

The mathematical contents consists of the topics that one would expect for an introductory coursebook: distance between nodes, trees, Euler graphs, Hamiltonian paths, factorization and decomposition of graphs, oriented and planar graphs, edge and vertex coloring. The linear algebra aspects are however completely ignored. For example the fundamental adjacency matrix is not even mentioned.

This can be recommended as a textbook that truly makes learning mathematics feel like fun. It is richly illustrated and it reads like a book on recreational mathematics, and yet there are theorems, proofs and exercises. To be really useful though, I think the absence of linear algebra is a handicap.

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