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The Fascinating World of Graph Theory

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Arthur Benjamin, Gary Chartrand & Ping Zhang, 2015
The Fascinating World of Graph Theory
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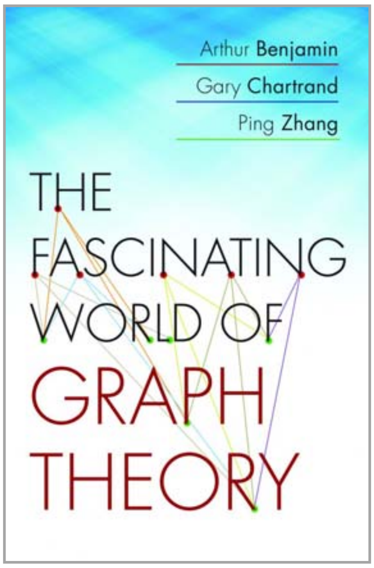

Anyone who has heard or read Arthur Benjamin of Harvey Mudd College knows how clear, simple and stimulating his expositions of seemingly complex material can be. In this book, he is joined by colleagues Gary Chartrand and Ping Zhang from Western Michigan University in a stimulating and grounded introduction to graph theory: stimulating because the problems it utilizes are sufficiently clear because of the text and associated figures many of which are grounded in simple analogies and applications or straightforward drawings.

The exposition of the theory in the text is interlaced with the pertinent parts of the philosophy and history of mathematics. Inevitably, there is the Königsberg Bridge Problem and the Knight’s Tour Puzzle, but there are many nuances such as the work of Peter Christian Julius Petersen (1839–1910) who wrote the first paper on graph theory of a purely theoretical nature in 1891. In a similar vein of exposition and humour in the topic of collaboration graphs is the description of the Bacon Number for actors in relation to the US actor Kevin Bacon (1958–) by analogy with the Erdös number for mathematicians with connections to the Hungarian mathematician Paul Erdös (1913–1996); both provide opportunities for clarifying the essential features of a graph. The humour here then extends to Mark Twain (Samuel Langhorne Clemens) and Lewis Carroll (Charles Ludwidge Dodgson) and other ‘imaginary’ authors. Of these, mention is made of William Tutte (1917–2002) who studied chemistry at Cambridge but who wrote many mathematics papers with three colleagues under the name Blanche Descartes! The serious side of this comes later in the book with Tutte’s Theorem, namely “A graph G contains a perfect matching if and only if $k_0(G - S) \leq |S|$ for every proper subset S of $V(G)$” in which $k_0(G)$ denotes the number of components of odd order in G.

The selected references at the end of the book are very comprehensive and they follow sets of challenging exercises for each of the twelve chapters. I envisage the book being a very useful text for genuine mathematics majors about halfway through a liberal arts degree. As a teacher I would certainly relish its structure, progression and lay-out.