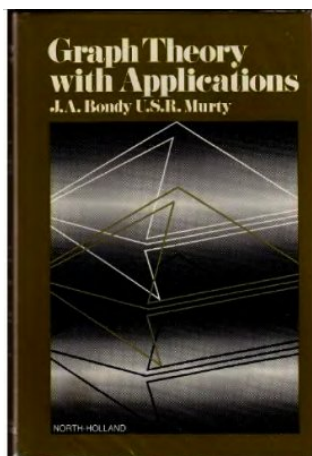


# Chapter 1. Graphs

**Note.** Bondy and Murty claim in the preface that “the development of graph theory was inspired and guided by the Four-Colour Conjecture” (page VII). This conjecture (now “theorem”) states that the countries on any map can be colored in such a way that two countries which share a boundary (not just a single point) are of a different color and this can be done using at most four different colors. However, many applied problems can be expressed in the language of graph theory (such as the traveling salesman problem which requires a salesman to visit a number of cities in such a way that the distance traveled is minimized) and this too has directed the development of graph theory. Graph theory is a relatively new area of mathematics that is a vibrant area of ongoing research.

**Note.** The textbook we are using in the graduate class grew out of the author’s 1976 *Graph Theory with Applications* (NY: North-Holland), a 250 page introductory text; in fact, I took my first graph theory class out of this book at Auburn University in 1985—it lead to me writing my master’s thesis on *Automorphisms of Steiner Triple Systems*, a topic arguably falling in the realm of algebraic graph theory.



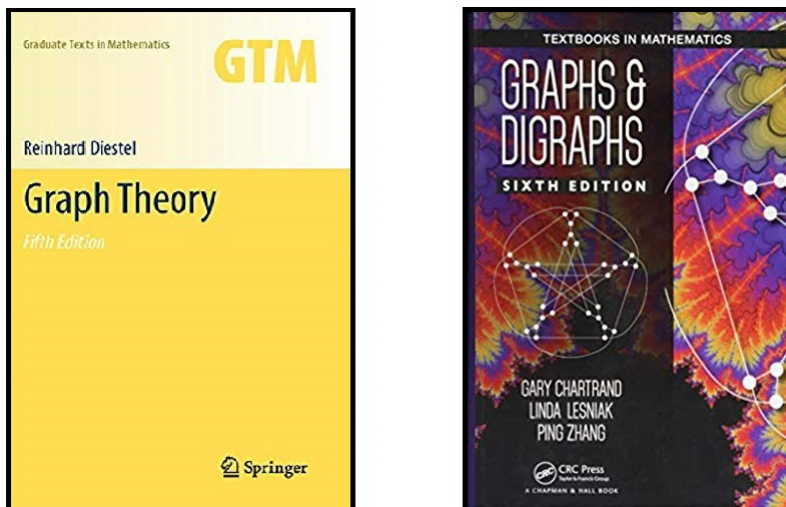
**Note.** An online copy of *Graph Theory with Applications* is available from [Web.Archive](#) (accessed 2/17/2020).

**Note.** Our graduate text has the objective of serving “as an introduction to research in graph theory” (Page IX) and includes a list of unsolved problems starting on page 583. The publisher has a [webpage for our text](#), including a link to a Blog with Errata; unfortunately the link to the errata is not currently (February 17, 2020) active. The exercises marked with a star (★) are needed for an understanding of the text (some definitions are introduced in these exercises, for example). The “more challenging” exercises are separated from the “easier ones” by a dividing line:      \_\_\_\_\_ ∞ \_\_\_\_\_

**Note.** Other graduate level texts which could be considered as competitors to Bondy and Murty include:

- *Graph Theory* (Graduate Texts in Mathematics 173) 5th edition, by Reinhard Diestel (Spring, 2018).
- *Graphs & Digraphs* 6th Edition, by Gary Chartrand, Linda Lesniak, and Ping Zhang, CRC Press/Taylor & Francis Group (2016).

The ETSU Sherrod Library has a 1997 copy of the Diestel book (QA166.D51413 1997) and you can read a 2000 online copy by signing in with your ETSU credentials. The ETSU library has three copies of *Graphs & Digraphs*; the 1986, 1996, and 2011 editions (QA166.C4525).



**Note.** Historically, ETSU has had a number of faculty involved in graph theory research. The first in the Department of Mathematics (as it was called at the time) was Linda Lawson, who started in the 1980s and retired around 2005. Debra Knisley started in the late 1980s and retired in 2018 (her research included graph parameters and biological applications). Jay Boland joined ETSU in 1991, but died young in 2006 (his research involved connectivity parameters). Teresa Haynes joined ETSU in the late 1980s as a member of the Department of Computer Science, but transferred to the Department of Math around 2000; her prolific research program mostly concentrates on graph domination. Robert “Dr. Bob” Gardner started at ETSU in 1993; though trained in complex analysis, research activity includes publications on graph decompositions/packings/coverings. Robert Beeler joined ETSU in 2007, and his research centers on graph decompositions and applications of graph theory to games and puzzles. ETSU has been the host of a number of graph theory conferences, including the Cumberland Graph Theory Conference several times (the first, in 1992).

*Revised: 8/25/2020*