

However, in my opinion, this is an excellent book, well-written, pleasant to read, and, as far as I am able to discover, quite accurate.

GRAPH THEORY 1736-1936. By N. L. Biggs, E. K. Lloyd, and R. J. Wilson. Oxford (Clarendon Press). 1976. 239 pp. \$27.85.

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This book is a classic! It brings together in an authoritative and interesting way the fascinating story of the earliest origins of the theory of graphs skillfully blended with appropriate selections, all of which are translated into English whenever necessary. Photographs of these pioneering mathematicians are included from Euler to König. We quote in full the second paragraph of the Preface: "Our decision to cover the period 1736-1936 is the result of a convenient historical accident. In 1736 the first article on a topic relating to graph theory was written by the Swiss mathematician Leonard Euler; just two hundred years later, in 1936, the first full-length book on the subject, written by Dénes König, was published. Of course, graph theory did not stop in 1936, and we have not felt obliged to exclude all reference to later work in the subject."

The contents of the book are indicated by the chapter headings: (1) Paths; (2) Circuits; (3) Trees; (4) Chemical Graphs; (5) Euler's Polyhedral Formula; (6) The Four-Colour Problem--early history; (7) Colouring Maps on Surfaces; (8) Ideas from Algebra and Topology; (9) The Four-Colour Problem--to 1936; (10) The Factorization of Graphs.

The selections are not chronological but topical. Some of these references, such as the original paper by Euler, two papers by Cayley, the combinatorial enumeration discoveries by Pólya, the articles by Kempe, Tait, and Heawood, the remarkable discoveries of Kirchhoff, and the characterization of planar graphs by Kuratowski, are very well known indeed. Others were not even known to the reviewer before the appearance of this book; these include articles by Hierholzer, Listing, Vandermonde, Kirkman, Frankland, L'Huilier, and Tietze.

The three appendices are very useful in rounding out the material in the text. These are titled (1) Graph Theory since 1936, (2) Biographical Notes, and (3) Bibliography: 1736-1936. The second appendix was most interesting, containing very brief biographies of mathematicians whose work contributed to the development of graph theory during this 200 year period. The last appendix, giving a bibliography of the subject for these 200 years, is arranged chronologically. It begins to give an indication of the amazing contemporary growth of the theory of graphs.

This book will facilitate the correction of some historical errors which have been appearing in standard works on graph theory. One of the most striking of these is that the seven bridges of Königsburg involve the two banks of the Pregel River and two islands; actually there is one island and a fork in the river. (This particular error appeared in the reviewer's book [*Graph Theory* 1969, Reading (Addison-Wesley)], which may be viewed as a subjective continuation of the book under review to 1968.)

It is amazing that only one misprint was noted. On page 31 it is stated that Hamilton sold his game for 25 pounds, whereas according to H. S. M. Coxeter, the amount was 25 guineas.

Another observation is that once credit is given for a discovery by name, this name seems to stick even though it is later shown that the idea had been found earlier by someone else. A typical example is given for Hamiltonian graphs; we cite from page 35: "In modern terminology a circuit which passes through each vertex of a graph exactly once is called a *Hamiltonian circuit*, and the graph itself is said to be *Hamiltonian*. It should be apparent that this terminology is not entirely justified. Hamilton, like Vandermonde over eighty years previously, was concerned with one special case, whereas Kirkman discussed a general question; furthermore, although their work was done independently, Kirkman was clearly the first to publish. Nevertheless, the terminology is now too standard to be changed, and we shall use it in the rest of this book."

The explanations of graph theoretic concepts which are presented in order to lead into the selections are so clear and self-contained that they can be read without any previous knowledge of graph theory. It is recommended enthusiastically to all graph theorists and all historians of mathematics.