"But the exponential number e is defined by

$$\lim_{k\to\infty} (1 + 1/k)^k$$

Hence $(1 + 1/k)^k < e$." (p. 9)

"A set of functions $f_1(x)$, $f_2(x)$, ..., $f_n(x)$ is linearly independent if $c_1 f_1 + c_2 f_2 + .. + c_n f_n = 0$ for all x and for values of the constants c_i which are not all zero. Hence the functions are linearly dependent if their Wronskian determinant vanishes." (p. 73)

Two other points caught my eye: the suggestion that the basic result $\lim_{x\to 0} \sin x/x = 1$ be "proved" by l'Hopital's rule (p. 11) and that the result

$$\frac{d}{dx}\int_a^x f(u)du = f(x)$$

be "derived" from a more general formula for $\frac{d}{dx}\int_a^b f(x,u)du$ where a and b are functions of x (p. 27).

The alert and intelligent student will enjoy the book (a good read for a good student?), but the less able student, if he were to follow the suggestion of the author and use this book as a "means of revision for examinations", could well find the experience a little alarming.

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"INTRODUCTION TO GRAPH THEORY" (3RD EDITION)

By *Robin J. Wilson*

Published by *Longman*, Harlow, Essex, 1985, viii + 168 pp.
Stg £5.95. ISBN 0-582-44685-6

"HINTS AND SOLUTIONS MANUAL FOR INTRODUCTION TO GRAPH THEORY"

By *Robin J. Wilson and W.J.G. Wingate*

Published by *Longman*, Harlow, Essex, 1985, 62 pp. ISBN 0-582-44703-8

Make no mistake - graph theory is coming! Computer science departments are realizing that the traditional calculus sequence is largely irrelevant to their needs. They are beginning to demand its replacement by various topics from discrete mathematics. Among these, graph theory comes high on the list. Given the large numbers of students which computing now attracts, mathematics departments can expect a lot of pressure to teach graphs (the non-calculus type). Since Euler first begat graph theory in Konigsberg in 1736, it has been a relatively minor branch of mathematics (the first textbook didn't appear until 1936). Today, 250 years on, it's finding its feet.

Wilson approaches his subject from a theoretical rather than an applied viewpoint. Proofs are generally given, except for some deeper results where a reference is supplied instead. The arguments are usually clear, two exceptions being those of Corollary 13D and Theorem 13G on pages 67 and 68 respectively, where some elaboration is needed. The style is pleasant and holds the reader's interest.

Most of the nine chapters contain a short section on applications. These sections go a long way towards justifying the inclusion of the various theoretical topics considered; without motivation, elementary graph theory tends to look like a collection of unrelated random results on graphs. My only quibble here is that Chapter 6, "the colouring of graphs", fails to make the reader fully aware of the variety of uses of graph colouring.

The book (like all graph theory texts) has a great number of definitions in its earlier pages. However, the language is very allusive and one easily absorbs this material. Why don't graph theorists agree on their basic terminology? The field cries out for some sort of rationalization. As Wilson points out on page 26, what he calls a circuit is also known in the literature as a cycle, elementary cycle, circular path and simple circuit! The most striking example of all is that the definition of a *graph* is not agreed on by everyone; some authors including Wilson permit "graphs" to have multiple edges, others don't.

Appel and Maken's computer aided proof of the four colour theorem is mentioned in a few places; obviously this edition of the book was written before serious doubts were cast on the proof, but this isn't the fault of the author. Students beware!

On page 12 two methods are described for storing graphs in computers. Perhaps the author should also mention *adjacency list representation*, which is commonly used.

At the beginning of this review, I mentioned the growing demand from computer science students for graph theory courses. Unfortunately, the present book isn't a good choice for the sort of course computer science departments usually have in mind, because it's basically theoretical. In the preface, Wilson claims his work is "suitable both for mathematicians taking courses in graph theory and also for non-specialists wishing to learn the subject as quickly as possible". The

claim is justified by this reasonably priced and very readable book.

I had found a mistake in exercise 19a on page 91 before the solutions manual arrived, but the manual to its credit had also detected the misprint. It gives answers to all the exercises, sometimes only in outline. All those I checked were correct. The preface notes that "each author wishes to make clear that any errors which occur are entirely the fault of the other"!

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"THE INS AND OUTS OF PEG SOLITAIRE" (RECREATIONS IN MATHEMATICS)

By *John D. Beasley*

Published by *Oxford University Press*, Oxford, 1985, Stg £12.50.
ISBN 0-19-853203-2

I have always carried a nagging desire to really understand the game of Solitaire, ever since a "flukey" solution on a train of "the central game" many years ago. On the standard English (or German) 33-hole board, a miraculous sequence of vertical and horizontal jumps had reduced a single vacancy at the centre to a sole survivor in that position. Many subsequent attempts to repeat the performance failed miserably. This book grants my wish completely.

Although the origins of the game are uncertain, it was known in the Western world almost three hundred years ago. The outline history of the game given by the author reveals its