supply is adequate. There are, inevitably, a few misprints but, fortunately for such a technical topic, not enough to distract.

The authors presume a lot of the reader's motivation. Perhaps this is realistic, for those who have not discovered that they do need some of this may take some convincing that it is interesting to them. The main shortcoming is editorial: the book badly needs a notation index and an improved main index. The index is far too sketchy for a book of this sort, whose main value will be for those who dip into it from time to time. Authors may be excused for overlooking this, but part of the importance of editors is to ensure that they are reminded of such essentials of publishing a book.

This is intended to be the first of two volumes. I look forward to the second.

D. S. G. STIRLING

BERGGREN, L., BORWEIN, J. and BORWEIN, P. *Pi: A Source Book* (Springer-Verlag, Berlin-Heidelberg-New York-London-Paris-Tokyo-Hong Kong, 1997), xix + 716 pp., 0 387 94924 0 (hardcover), £37.50.

The number π is surely the most widely known of the fundamental mathematical constants: its origins lie in the problems of finding the area and circumference of a circle – indeed, before the general adoption of a symbol for this number it was often referred to as 'the quadrature of the circle' (the radius 1 being understood) – and these are familiar to high school pupils; yet it appears frequently in formulae at the highest levels of mathematics. From early times people have been calculating π with increasing accuracy, using a variety of methods which have opened up new areas of research, and in more recent times there has been much theoretical activity devoted to understanding the nature of π. All this has generated a vast literature, from which the authors have made a personal selection of some seventy items. The Borweins have been at the forefront of recent research both theoretical and computational, so we may be sure that the selection has been made with care and authority.

The authors identify three broad classes into which their selected items fall:

(i) 'the accumulated mathematical research literature of four millennia';

(ii) 'historical studies of pi' and 'writings on the cultural meaning and significance of the number';

(iii) 'treatments of pi that are fanciful, satirical or whimsical, or just wrongheaded'.

The selections are arranged according to the period to which they refer: items 1–15 were written in or refer to the pre-Newtonian period; items 16–24 take us up to Hilbert; and items 28–70 are concerned with twentieth century developments. Item 25 belongs to the authors' third class and relates along with items 26 and 27 to the attempt by the state of Indiana to legislate on the value of π.

The pre-Newtonian items begin with Problem 50 from the Rhind papyrus and contain material on Egyptian, Greek, Chinese, Indian and European contributions. Newton, Euler, Lambert, Shanks, Hermite, Lindemann, Weierstrass and Hilbert are the authors represented in the second period; they deal with computations, irrationality and transcendence. Well over half of the items presented are twentieth century developments, theoretical and computational aspects occurring in equal measure. A detailed outline of this material would take up too much space, so I simply note that Ramanujan, arithmetic-geometric means and the Borweins are well-represented and there are several items which fall into the third class. Some items are devoted to the number e, Euler's constant γ or aspects of the Riemann zeta function, all of which are intimately connected with π.

Material is presented in facsimile form, either from the original or from a later article where the item is reproduced or discussed. In the Contents pages each item is listed along with a brief statement of its content or purpose. The authors tell us a little about their aims, some of the selected items and the design of their Source Book in the Preface (3 pages) and Introduction (3 pages). They provide three appendices: 'On the Early History of Pi' (6 pages); 'A Computational Chronology of Pi' (3 pages); 'Selected Formulae for Pi' (4 pages). There is also a Bibliography of 130 items and a useful Index. Otherwise, readers are left to their own devices – there are no commentaries or notes accompanying individual items and in several cases material in Latin, French or German is presented without translation.

I am sure that this Source Book will prove to be of value. Because of the breadth of material included there should be something for almost everyone. Serious researchers in historical or modern aspects of the study of π will find it a convenient starting point. It will also provide a fruitful supply of material for undergraduate projects. However, I am a little disappointed in the presentation of some of the material. Inevitably, comparisons will be made with other Source Books, in particular with D. J. Struik's classic *A Source Book in Mathematics, 1200–1800* (Harvard, 1967), which in my opinion is a much more user-friendly work. Struik leads the reader gently into each item with a short introduction (and also provides explanatory notes). In the present Source Book it is not always clear without reference to the Contents and Bibliography who the author of a particular item is and where it comes from. This is not a problem with items which are complete journal articles, but I feel that extracts from longer articles would be much improved in presentation if they were introduced by at least a clear heading accompanied by bibliographic details.

I. TWEDDLE

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