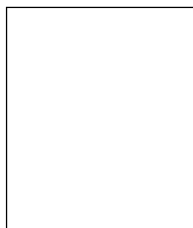


# Mathematical Analysis, A Straightforward Approach

**K Ramamurthy**



*Mathematical Analysis,  
A Straightforward Approach*  
(II Edition)  
K G Binmore  
Cambridge University Press, 1991  
pp.370, Rs. 125

The book deals with mathematical analysis at the post-calculus, pre-measure theory level. It is an excellent book for a one semester course on the subject at the bachelor's level for mathematics students and master's level for students of various other disciplines like economics, statistics, engineering etc. who need a basic knowledge of mathematical analysis.

The background required for the book is very minimal. Of course, training in basic methods of calculus is essential for reading this book.

As the author says in the preface, "the temptation to discuss generalisations in more abstract spaces" (than the real line) "has been reluctantly suppressed. However the need to prepare the way for these generalisations has been kept in mind". Here is a good example of the applicability of the methods in the book to more general situations: the Riemann integral for a continuous function on a closed interval is defined as the least upper bound of the lower Riemann sums. Using this definition it is shown that the derivative of the

indefinite integral of a (continuous) function is the function itself. In turn this fact is used to show that the integral is also the greatest lower bound of the upper Riemann sums. This approach can actually be used to define the more general Lebesgue integral as shown in *Introduction to Integration, H A Priestley, Oxford Science Publications, 1997.*

The treatment in the book is elaborate and slow paced in the beginning. The author picks up speed gradually making the last two chapters fairly fast paced. (These two chapters were added in the second edition and they deal with analysis on vector spaces). The book has a large number of exercises; solutions to exercises take up more than ninety pages of the book!

In the preface to *A Hilbert Space Problem Book, Paul Halmos* says "The only way to learn mathematics is to do mathematics". While it is nice to have solutions to exercises, young readers are advised restraint and they should use the solutions only after putting in enough hard work to solve the problems on their own.

The book was very popular in the international edition and Cambridge University press deserves to be congratulated for bringing out a low cost Indian edition of the book.

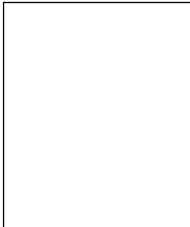
The book is strongly recommended for a pre-measure theory course in analysis in Indian universities and institutions.

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# A Primer of Mathematical Writing

*Rajat Tandon*



*A Primer of Mathematical Writing*  
Steven G Krantz  
American Mathematical Society,  
1997

First published in India by  
Universities Press (India) Limited,  
Hyderabad, 1998, pp 223, Rs 145

*You don't write because you want to say something; you write because you've got something to say—*  
F Scott Fitzgerald quoted by Steven Krantz.

This book will be of great help to any academic (teacher, research worker or student) who writes papers, books, expository articles, referee reports, letters of recommendation, CVs, book reviews, does collaborative work, corresponds by e-mail, applies for academic jobs and above all uses the computer for doing so.

Steven Krantz leaves nothing to chance. With the typewriter moving out of departmental offices and the PC moving into the rooms of individual faculty and academics doing much of their work like correspondence, typing of papers etc on their own he has seen the need for a primer on mathematical writing. What is quite extraordinary is the comprehensiveness with which he has approached his task. He has thought of everything. A list of some of the topics he has covered – how to write a paper, the etiquette of collaboration,

how to write an expository article, a letter of recommendation, a referee report, your vitae, apply for a job or even what is expected of a book review; how to write a book and how to get it published; email etiquette or even how to do collaborative work via email; softwares available, the internet or why writing is important.

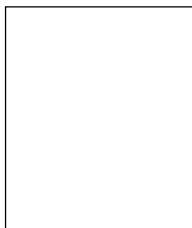
Krantz's recommended style is extremely proper, one which the Oxbridge academic would certainly agree. He prefers a style that is simple (avoid big words and jargon wherever possible), formal (no place for contractions like 'don't', 'I'm' etc), avoids using cliches like 'nice', 'interesting' and, in fact, discourages expressions of opinion. He deals with doubts about usage like when to use 'all', 'any', 'each' or 'every'. If you have a manuscript you would like to get published but do not know what to do with, Krantz has some useful tips.

This is what the author advises about organising a talk. He feels that the first twenty minutes should be accessible to a graduate student, the next twenty minutes within the ambit of "a mathematically literate person who is not a specialist" and the last ten minutes "for experts, for God and for you". It is, of course, assumed that all these categories of people are present in the audience. Eminently sensible.

For the conservatively minded, who value etiquette and form this book would be a useful reference.

## Six Easy Pieces

**V Balakrishnan**



*Helix Books*  
 Richard P Feynman  
 Addison–Wesley, Reading, Mass,  
 October 1997 (6th Printing)  
 ISBN 0-201-40825-2, pp 146,  
 \$ 12.00

Richard Phillips Feynman was, without any doubt, one of the greatest physicists of this century. Ten years after his death in 1988 at the age of sixty-nine, the Feynman legend is as lively as ever. Several collections of Feynman anecdotes and adventures have appeared in recent years (*Surely You're Joking, Mr Feynman; What Do You Care What Other People Think?; Tuva or Bust! No Ordinary Genius: The Illustrated Richard Feynman*), as have several biographies (*The Beat of a Different Drum; Most of the Good Stuff; Genius: Richard Feynman and Modern Physics; Richard Feynman – A Life in Science*). A wide readership now knows about Feynman's Adventures outside the realm of physics – his early years at MIT and Princeton as an undergraduate and as a graduate student, his experiences at Los Alamos as a young genius working on the Manhattan Project, his trip to Brazil, his expertise on the bongo drums, and so on, right up to his final public triumph when he demonstrated how the failure of an O-ring caused the *Challenger* disaster.

In the world of physics and physicists, Feynman burst into the limelight at an early

age. World-renowned physicists such as Hans Bethe and Robert Oppenheimer had already judged him to be a genius of the highest order when he was in his twenties, and by 1949 (when he was barely thirty-one years old), his revolutionary way of doing what we now call quantum field theory had won universal acceptance and acclaim. From the earliest days, what struck all those who came into contact with him as truly remarkable were his powers of exposition and explanation, and his extraordinary, almost magical, insight into the way the physical world works. The story of how he was persuaded to spend two years (1961–63) of concentrated effort in teaching physics to undergraduates the way he felt it should be is well known. The eventual outcome was *The Feynman Lectures on Physics*, the celebrated three-volume presentation of basic physics (and a host of related topics) by “an extraordinary teacher of teachers”, a “theoretical physicist par excellence”, a magician of the highest calibre”.

Feynman himself did not regard his effort as having been entirely successful in terms of its original goal, and it is more-or-less generally acknowledged that the *Lectures* by themselves would not be the best choice as the sole or even the most appropriate texts for the standard introductory course in physics. However, over the years it has become clear that they are simply superb in another, probably more important, respect: as a unique source of insight and perspective for all those who already have some knowledge of basic physics – advanced students and, above all,



teachers of the subject. It was undoubtedly a realization of this aspect that made Feynman allow in later years as to how the *Lectures* might perhaps be his most *lasting* contribution to science.

It is therefore a welcome development that in recent times the *Lectures* and selected portions of these, as well as other books and lectures by Feynman have been reprinted in new editions, put on videotape and CDs. *Six Easy Pieces* (sub-titled *Essentials of Physics Explained by Its Most Brilliant Teacher* by the publishers) is a reprint of six chapters of the *Lectures*. Claimed to be “the six easiest chapters from Feynman’s celebrated and landmark text”, they do comprise the earliest chapters of the original *Lectures*, by a large: Chapters 1,2,3,4 and 7 of Volume 1, and Chapter 37 of Volume 1 (which is also chapter 1 of Volume 3) on quantum behaviour. In their present setting, they present to a beginning student a far less formidable appearance than the complete *Lectures*, and are therefore a much more effective *invitation* to physics. They are “easy” in the sense that they are introductory in nature, have been couched deliberately in non-mathematical (yet precise) terms, and are masterpieces of clarity. But “easy” should not be confounded with “trivial”, because they are also profound! A quick run-through of the contents should convince any physicist of this: in the course of some 140 small-sized pages, Feynman ranges through atoms, nuclei, particles, energy, gravitation and quantum mechanics, as well as a reasoned essay on the relation of physics to other sciences such as

chemistry, biology, astronomy and geology.

One could wish, of course, that more material had been included in the book to make it, say, *Ten Easy Pieces* or *Twenty.....*” eventually, to end up with the complete *Lectures* themselves - and then one could go on to add *more* things of interest, and so on, till one’s private idea of what physics is all about is substantially fulfilled! On the other hand, one could ask: after reading *Six Easy Pieces*, what should one read next? I think an excellent choice, and one in the same spirit, would be *The Character of Physical Law* - the written version of the Messenger Lectures delivered by Feynman in 1964 at Cornell, and reprinted recently in an inexpensive edition. And then again, wouldn’t it be wonderful to have three-in-one-package of *Six Easy Pieces*, *The Character of Physical Law*, and that other beautiful book by Feynman, *QED: The Strange Theory of Light and Matter*? But all this would be missing the point behind *Six Easy Pieces*; we must keep the whole thing short and sweet. Let us suppose that we are permitted to add just one more chapter from the *Lectures*. Which chapter would be the best for the purpose? What shall we add - the first chapter on electromagnetism? Or the chapter on the laws of thermodynamics? My own choice, keeping in mind the spirit and purpose behind the selection of first six easy pieces, would be the last chapter in Volume 1, namely, *Symmetry in Physical Laws*. We should then have *Seven Easy Pieces*, matching the days of the week and making it a grand creation indeed.....



In the very first chapter of *Six Easy Pieces* (which is also that of the *Lectures*), Feynman makes the following thoughtful remark:

“If, in some cataclysm, all of scientific knowledge were to be destroyed, and only one sentence passed on to the next generations of creatures, what statement would contain the most information in the fewest words? I believe it is the *atomic hypothesis* (or the *atomic fact*, or whatever you wish to call it) that *all things are made of atoms - little particles that move around in perpetual motion, attracting one another when they are a little distance apart, but repelling upon beings squeezed into one another.*”

In exactly the same spirit, if one could pass on just *one little book* to our successors, what should that be? The more I think about it, the more I feel that *Six Easy Pieces* would be (given the present state of human affairs, it would be more realistic to say *should be*) very near the top of any short list of contenders for this privilege. Of course, it would be so nice if one could smuggle in *The Character of Physical Law* as well, and perhaps also.....

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