Gradshteyn Ryzhik PhL 1.18.10

Summary: I have downloaded the most current 7th version as a PDF. It is $60 on Amazon. I also have a PDF of new errata for this edition through April 2008. Some history is given below. There is a web site for reporting errata and for seeing the current status.

About GR:

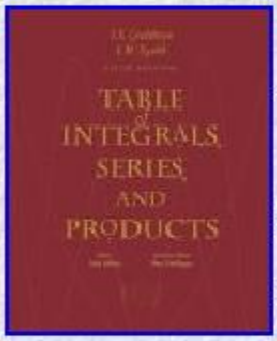
I have never investigated errata for my 1965 Fourth Edition. Now that I am relying heavily on this book, it is perhaps time I check things out a bit.

First of all, let's look at the edition history:

I go to http://www.mathtable.com/gr/ and see this information:



Gradshteyn and Ryzhik's *Table of Integrals, Series, and Products*
Alan Jeffrey and Daniel Zwillinger (eds.)
Seventh edition (Feb 2007)
1171 pages
ISBN number: 0-12-373637-4
(includes a CD-ROM)



Gradshteyn and Ryzhik's *Table of Integrals, Series, and Products*
Alan Jeffrey and Daniel Zwillinger (eds.)
Sixth edition (July 2000)
1163 pages
ISBN number: 0-12-294757-6
Table of contents available here
Errata in PDF format



Gradshteyn and Ryzhik's *Table of Integrals, Series, and Products*
Alan Jeffrey (ed.)
Fifth edition (January 1994)
1204 pages
ISBN number: 0-12-294755-X
Table of contents available here
CD-ROM version (ISBN number: 0-12-294756-8)

which shows the years of publication of editions 5,6, and 7. You can see that for the last three editions, the editors have been Alan Jeffrey (Newcastle upon Tyne) and Daniel Zwillinger. The above site has much to say. My 1965 4th Ed has Jeffrey as the "translation editor", but "prepared by" is two Russian names Ger and Tse.

Jeffrey has a low web profile. He must be 40+45 = 85 years old now, just a guess, so probably Zwillinger is the main workhorse. He has an instant large web page. PhD 1983 Caltech. I follow this to a list of errata even for the 7th edition! http://www.mathtable.com/errata/ It is April 11, 2008 so the errata has not been brought in for a year.

The same page as the picture above has more interesting info:

- **Derivations**
  Victor Moll of Tulane has started the ambitious process of verifying the integrals in GR. Many proofs are here. Please visit this link, and contact him (vhm at math.tulane.edu), if you have proofs of G&R integrals.

so here is the list of "proofs" (derive the integrals) http://www.math.tulane.edu/~vhm/Table.html
Wow, I like it! My integral of interest today however has not been proven yet.

Now a lot about errata:

- **Latest edition**
  - The 7th edition contains many new results that are not in the 6th edition.
  - While constructing the 7th edition many new errata in the 6th edition were discovered and fixed; but they were not recorded in the last set of errata for the 6th edition.
- **Errata** (Please send any new errata to Daniel Zwillinger)
  - 7th edition errata
    - Latest errata in PDF (in PDF, from 11 April 2008)
  - 6th edition errata
    - Last collection of errata (in PDF, from 26 April 2005)
  - 5th edition errata
    - Table Errata **634**, *Mathematics of Computation*, **67**, October 1998, pages 1753-1754 (by G. Fikioris)
    - Table Errata **628**, *Mathematics of Computation*, **66**, January 1997, page 463
    - Table Errata **617**, *Mathematics of Computation*, **64**, January 1995, pages 449-460
  - 4th edition errata
    - Table Errata **607**, *Mathematics of Computation*, **47**, 1986, page 768
    - Table Errata **601**, *Mathematics of Computation*, **41**, 1983, pages 780-783
    - Table Errata **589**, *Mathematics of Computation*, **39**, 1982, pages 747-757
    - Table Errata **577**, *Mathematics of Computation*, **36**, 1981, pages 317-318
    - Errata, *Mathematics of Computation*, **36**, 1981, pages 312-314
    - Wolfram's *Errors in the Integral Tables of Gradshteyn and Ryzhik with Correct Results from Mathematica*

That same MC journal that had the Bateman stuff. See above for link to 7th ed errata which I downloaded.

- **Links to interesting web locations related to integrals**
  - Richard Fateman has a web site for looking up integrations over the web, visit TILU (Table of Integrals Look Up)
  - Wolfram has a web site for performing integrations over the web, visit www.integrals.com

The TILU link is dead. I looked up Fateman, he has taken it down for now.

Send email to Alan Jeffrey at Alan.Jeffrey@newcastle.ac.uk
Send email to Daniel Zwillinger at zwilling@az-tec.com

So I have gotten everything off the above page which was http://www.mathtable.com/gr/

The current 7th edition Amazon price today is a mere $60 with free shipping. This is without CD ROM. I think a CD ROM was made in 1996. Well, I think this comes with the 7th edition if you just buy it, this is what some reviewers say. I could ask.

Download 7th Ed PDF.

I just found this 7th Edition in PDF at scribd and am bringing it in, it is 7.3 MB. I have to assume this incorporates all errata since 1965 ! I have it and it comes up OK, index on the left. The cover of the book says CD included on it. The cover Amazon presents shows the "CD included" icon upper right, so it must have the CD.

Preface to the Seventh Edition

Since the publication in 2000 of the completely reset sixth edition of Gradshteyn and Ryzhik, users of the reference work have continued to submit corrections, new results that extend the work, and suggestions for changes that improve the presentation of existing entries. It is a matter of regret to us that the structure of the book makes it impossible to acknowledge these individual contributions, so, as usual, the names of the many new contributors have been added to the acknowledgment list at the front of the book.

This seventh edition contains the corrections received since the publication of the sixth edition in 2000, together with a considerable amount of new material acquired from isolated sources. Following our previous conventions, an amended entry has a superscript "11" added to its entry reference number, where the equivalent superscript number for the sixth edition was "10." Similarly, an asterisk on an entry's reference number indicates a new result. When, for technical reasons, an entry in a previous edition has been removed, to preserve the continuity of numbering between the new and older editions the subsequent entries have not been renumbered, so the numbering will jump.

We wish to express our gratitude to all who have been in contact with us with the object of improving and extending the book, and we want to give special thanks to Dr. Victor H. Moll for his interest in the book and for the many contributions he has made over an extended period of time. We also wish to acknowledge the contributions made by Dr. Francis J. O'Brien Jr. of the Naval Station in Newport, in particular for results involving integrands where exponentials are combined with algebraic functions.

Experience over many years has shown that each new edition of Gradshteyn and Ryzhik generates a fresh supply of suggestions for new entries, and for the improvement of the presentation of existing entries and errata. In view of this, we do not expect this new edition to be free from errors, so all users of this reference work who identify errors, or who wish to propose new entries, are invited to contact the authors, whose email addresses are listed below. Corrections will be posted on the web site `www.az-tec.com/gr/errata`.

Alan Jeffrey
`Alan.Jeffrey@newcastle.ac.uk`

Daniel Zwillinger
`zwillinger@alum.mit.edu`

Nothing is said about the history of this book! But I have found a nice Wolfram article

http://www.stephenwolfram.com/publications/recent/specialfunctions/

and here is what he has to say: (he says quite a lot in fact about other things)

I still don't know the full story. But here's what I know.... In 1936 Iosif Moiseevich **Ryzhik** had a book entitled *Special Functions* published by the United Moscow-Leningrad Scientific-Technical Publisher. **Ryzhik died in 1941**, either during the siege of **Leningrad**, or fighting on the Russian front. In 1943, a table of formulas was published under Ryzhik's name by the Governmental Moscow-Leningrad Technical-Theoretical Publisher. The only thing the book seems to say about its origins is that it's responding to the shortage of books of formulas. It says that some integrals marked in it are original, but the others mostly come from three books--a French one from 1858, a German one from 1894, and an American one from 1922. It explains that effort went into the ordering of the integrals, and that some are simplified by using a new special function *s* equal to `Gamma[x+y-1]/(Gamma[x]Gamma[y])`. It then thanks three fairly prominent mathematicians from Moscow University. That's basically all we know about Ryzhik. It's more than we know about Euclid--but not much.

OK, so now for the next part of the story. Israil Solomonovitch **Gradshteyn** was born in 1899 in Odessa, and became a professor of mathematics at Moscow State University. But in 1948, he was fired as part of the Soviet attack on Jewish academics. To make money, he wanted to write a book. And so he decided to build on Ryzhik's tables. Apparently he never met Ryzhik. But he created a new edition, and by the third edition, the book was known as Gradshteyn-Ryzhik.

Gradshteyn died of natural causes in Moscow in 1958. Though somehow there developed an urban legend that one of the authors of Gradshteyn-Ryzhik had been shot as a piece of anti-Semitism on the grounds that an error in their tables had caused an airplane crash.

Meanwhile, starting **around 1953, Yurii Geronimus**, who had met Gradshteyn at Moscow State University, began helping with the editing of the tables, and actually added the appendices on special functions. Later on, several more people were involved. And when the tables were published in the West, there were arguments about royalties. But Geronimus is now still alive and well and living in Jerusalem, and Oleg phoned him last week.

I guess integrals are timeless. They don't really bear the marks of the human creators. So we have the tables, but we really don't quite know where they came from.

My integral of interest today is unaltered (the second one below) [and nothing in the errata 2008]

3.67 Square roots of expressions containing trigonometric functions

3.671

1. $$\int_0^{\pi/2} \sin^\alpha x \cos^\beta x \sqrt{1-k^2\sin^2 x}\, dx = \frac{1}{2}\mathrm{B}\left(\frac{\alpha+1}{2}, \frac{\beta+1}{2}\right) F\left(\frac{\alpha+1}{2}, -\frac{1}{2}; \frac{\alpha+\beta+2}{2}; k^2\right)$$
$$[\alpha > -1, \quad \beta > -1, \quad |k| < 1]$$
GW (331)(93)

2. $$\int_0^{\pi/2} \frac{\sin^\alpha x \cos^\beta x}{\sqrt{1-k^2\sin^2 x}}\, dx = \frac{1}{2}\mathrm{B}\left(\frac{\alpha+1}{2}, \frac{\beta+1}{2}\right) F\left(\frac{\alpha+1}{2}, \frac{1}{2}; \frac{\alpha+\beta+2}{2}; k^2\right)$$
$$[\alpha > -1, \quad \beta > -1, \quad |k| < 1]$$
GW (331)(92)