Computation of confluent hypergeometric function 1F1 with complex arguments?

Asked 9 years, 2 months ago Modified 1 year, 10 months ago

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1

Is there a routine in R for computing the Kummer's confluent hypergeometric function $_1F_1(a,b,z)$ for complex arguments?

R r

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edited Oct 18, 2015 at 19:28

Ben Bolker

225k ● 26 ● 396 ● 490

asked Oct 18, 2015 at 17:36

a06e

20.6k ● 35 ● 100 ● 179

1 Which packages did you try? Did you look up CRAN Taskviews? – kjetil b halvorsen Oct 18, 2015 at 17:42

2 To maximize upvotes/minimize chance of closure, you might consider: (1) (echoing @kjetilbhalvorsen) explaining what you've tried so far and (2) reframing your question as much as possible as "how can I do xxx?" and not as "is there a

routine to do xxx?" (which approaches the dreaded "recommend or find a book, tool, software library, tutorial or other off-site resource" question type ...) – Ben Bolker Oct 18, 2015 at 19:31

1 Answer

Sorted by: Highest score (default)

5

`library("sos"); findFn("Kummer")` got me to the hypergeometric functions from the fAsianOptions package, specifically the `kummerM` function.

> ‘kummerM’ the Confluent Hypergeometric Function of the 1st Kind
>
> ...
>
> The functions use the TOMS707 Algorithm by M. Nardin, W.F. Perger and A. Bhalla (1989). A numerical evaluator for the confluent hypergeometric function for complex arguments with large magnitudes using a direct summation of the Kummer series. The method used allows an accuracy of up to thirteen decimal places through the use of large real arrays and a single final division.

I have no idea what sensible inputs would be, but I can get *an* answer for complex values:

```
kummerM(x=1i, a=1i, b=1i)
## [1] 0.5403023+0.841471i
```

This agrees with the result from Wolfram Alpha ...

Edit: this package was deleted from CRAN. But it is still on GitHub: https://github.com/cran/fAsianOptions

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edited Feb 10, 2023 at 12:05

Cedric Jüssen

13 ● 5

answered Oct 18, 2015 at 18:56

Ben Bolker

225k ● 26 ● 396 ● 490