Re: Q: how to compute modulo Pi for large arguments?

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From: Axel Vogt (*nonail_at_axelvogt.de*)
Date: 06/01/04

Date: Tue, 01 Jun 2004 20:40:34 +0200

Russell Wallace wrote:
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> On Sun, 30 May 2004 19:37:57 +0200, Axel Vogt <nonail@axelvogt.de>
> wrote:
>
> >May be that is a naive question in numerics ...
> >
> >Given a positive real or natural number x <= 1E308 i want the
> >the remainder of x/Pi with precision of ~ 15 − 18 digits. And
> >want to use it for periodics of large arguments in a C pgm.
>
> Is that going to be possible?
>
> Suppose x ~= 1E300. Now, given that you mentioned 1E308 and C, I
> assume you're talking about 64−bit floating point.
>
> But that's only got ~16 digits of precision at the best of times. So
> the error in the input is going to be on the order of 1E284, isn't it?
> Someone with more expertise in numerical analysis please correct me if
> I'm missing something, but as far as I can see you'd need a format
> that can represent 1E300 with an error << pi, i.e. one that has more
> than 300 digits of precision?

Yes, i am aware of the presentation problem (or how that is named): 10^n and 1 + 10^n certainly have a different sinus.

A check with MSVC against Maple shows that already for n=7 exactness falls to 13 digits (and not as they say in their help it would be around n=19). Using 'gsl_sf_sin' behaves much better (GSL can partially be interfaced with Maple), 0.5*10^10 is still exact for the 14th digit.