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Subject: Re: Julian time problem  
Posted by [Paolo Grigis](#) on Fri, 24 Nov 2006 13:21:44 GMT  
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They \*are\* the same:

[http://www.dfanning.com/math\\_tips/sky\\_is\\_falling.html](http://www.dfanning.com/math_tips/sky_is_falling.html)

You might want, instead of checking for equality,  
to do something like

```
ind=where(abs(time1-time2) LT 1d-9)
```

Think that one part in  $10^{10}$  of a day is just a few microseconds!

Ciao,  
Paolo

corinnefrey@gmail.com wrote:

```
> Hi,  
>  
> I have following problem:  
>  
> First I define two times in the Julian system:  
>  
> jul_time1=JULDAY(11,5,2006,10,10)  
> jul_time2=JULDAY(11,5,2006,10,20)  
>  
> Then I make a time array which starts at the first time given above  
>  
> time_array= TIMEGEN(30,units="minutes", START=jul_time1)  
>  
> The second time is only 10 minutes after the first time, so I should be  
> able to find it in the generated time array.  
>  
> When I print, I get following thing:  
>  
> IDL> print,time_array(10),format='(d20.5)'  
> 2454044.93056  
> IDL> print,jul_time2,format='(d20.5)'  
> 2454044.93056  
>  
> That seems to be ok! But if I make the difference then I don't get  
> zero:  
>  
> IDL> print,time_array(10)-jul_time2  
> 4.6566129e-010
```

>  
> What happen here? The jul\_time2 and the time\_array are both in DOUBLE  
> format.  
>  
> IDL> help,jul\_time2  
> JUL\_TIME2 DOUBLE = 2454044.9  
> IDL> help,time\_array  
> TIME\_ARRAY DOUBLE = Array[30]  
>  
> I need to have both numbers the same, so that I can search in the time  
> string for a desired time or date.  
>  
> Thanks for your help,  
> corinne  
>

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Subject: Re: Julian time problem  
Posted by [Jonathan Dursi](#) on Fri, 24 Nov 2006 13:30:47 GMT  
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Paolo Grigis wrote:  
> They *are* the same:

In particular, the difference between the two quantities ( $\sim 4.65e-10$ ) is a couple parts in  $1e16$  of the value ( $\sim 2.45e6$ ), and you simply can't do better than that in the usual IEEE double precision math.

If your methods depend sensitively on floating point values giving you results more precise than a few parts in  $10^{16}$ , then I fear your life will be full of sadness, or at least computationally expensive arbitrary precision mathematics libraries.

- Jonathan  
--  
Jonathan Dursi  
[ljdursi@cita.utoronto.ca](mailto:ljdursi@cita.utoronto.ca)  
<http://www.cita.utoronto.ca/~ljdursi/>

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Subject: Re: Julian time problem  
Posted by [badjelly.witch](#) on Mon, 27 Nov 2006 00:18:50 GMT  
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Jonathan Dursi wrote:  
> In particular, the difference between the two quantities ( $\sim 4.65e-10$ ) is  
> a couple parts in  $1e16$  of the value ( $\sim 2.45e6$ ), and you simply can't do

> better than that in the usual IEEE double precision math.

Another issue here, apart from the general imprecision of floating point math, is that TIMEGEN adds a small offset. From the documentation:

"A small offset is added to each Julian date to eliminate roundoff errors when calculating the day fraction from the hour, minute, second. This offset is given by the larger of EPS and EPS\*Julian, where Julian is the integer portion of the Julian date and EPS is the double-precision floating-point precision parameter from MACHAR. For typical Julian dates the offset is approximately  $6 \times 10^{-10}$  (which corresponds to  $5 \times 10^{-5}$  seconds). This offset ensures that when the Julian date is converted back to the hour, minute, and second, the hour, minute, and second will have the same integer values."

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