Subject: Re: Differentiation in IDL Posted by Wox on Mon, 16 Oct 2006 13:54:27 GMT

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```
Specify x?
dx = DERIV(x * !dtor,data)
On Mon, 16 Oct 2006 07:49:21 -0600, David Fanning <news@dfanning.com>
wrote:
> Folks,
> OK, I'm missing something crucial here.
> Suppose I have a sine function:
   x = Findgen(360)
>
   data = Sin(x * !dtor)
   Plot, data
>
>
> I know that d/dx(\sin(x)) = \cos(x). So, I would expect
> a cosine looking curve if I differentiate the data above.
   dx = DERIV(data)
>
   OPlot, dx, Linestyle=2
>
> The differentiated curve is almost a straight line! One
> could argue that it might have the correct cosine *shape*
> (squint your eyes a little bit), but the scale is vastly
> different. How come?
> Cheers,
> David
```

Subject: Re: Differentiation in IDL Posted by David Fanning on Mon, 16 Oct 2006 13:56:41 GMT View Forum Message <> Reply to Message

Wox writes:

```
> Specify x?
> 
> dx = DERIV(x * !dtor,data)
```

```
Oh, sorry.
 x = findgen(360)
David
David Fanning, Ph.D.
Fanning Software Consulting, Inc.
Coyote's Guide to IDL Programming: http://www.dfanning.com/
Sepore ma de ni thui. ("Perhaps thou speakest truth.")
```

Subject: Re: Differentiation in IDL Posted by David Fanning on Mon, 16 Oct 2006 13:59:02 GMT View Forum Message <> Reply to Message

David Fanning writes:

> Wox writes:

```
>> Specify x?
>> dx = DERIV(x * !dtor,data)
>
> Oh, sorry.
   x = findgen(360)
> David
Oh, sorry. I misunderstood. Yes, this does it. Thank you!
```

David

David Fanning, Ph.D.

Fanning Software Consulting, Inc.

Coyote's Guide to IDL Programming: http://www.dfanning.com/

Sepore ma de ni thui. ("Perhaps thou speakest truth.")

Subject: Re: Differentiation in IDL Posted by Braedley on Mon, 16 Oct 2006 14:15:06 GMT View Forum Message <> Reply to Message

Also, d/dx(f(g(x)))=f'(g(x))*g'(x) (chain rule), so in your case, d/dx(sin(x*!dtor))=cos(x*!dtor)*!dtor

If you divide the result from DERIV by !dtor, you'll get the result you're looking for. My suggestion would be to declare x as x=findgen(360)*!dtor to begin with.

Cheers

```
David Fanning wrote:
> David Fanning writes:
>> Wox writes:
>>
>>> Specify x?
>>>
>>> dx = DERIV(x * !dtor,data)
>> Oh, sorry.
>>
    x = findgen(360)
>>
>> David
>>
> Oh, sorry. I misunderstood. Yes, this does it. Thank you!
>
> David
> David Fanning, Ph.D.
> Fanning Software Consulting, Inc.
> Coyote's Guide to IDL Programming: http://www.dfanning.com/
> Sepore ma de ni thui. ("Perhaps thou speakest truth.")
```

Subject: Re: Differentiation in IDL Posted by Allan Whiteford on Mon, 16 Oct 2006 14:26:26 GMT View Forum Message <> Reply to Message

Dear All,

Surely when you type:

dx = DERIV(x * !dtor,data)

you're actually doing:

 $d/d(x^*!dtor) (sin(x^*!dtor))$

which is:

cos(x*!dtor)

i.e. you shouldn't need to divide the result by !dtor.

Of course, declaring x as findgen(360)*!dtor to start with looks a lot cleaner and is probably easier to follow, but I don't think what was suggested by Wox gives the wrong answer.

```
Thanks,
Allan
Braedley wrote:
> Also, d/dx(f(g(x)))=f'(g(x))*g'(x) (chain rule), so in your case,
> d/dx(sin(x*!dtor))=cos(x*!dtor)*!dtor
> If you divide the result from DERIV by !dtor, you'll get the result
> you're looking for. My suggestion would be to declare x as
     x=findgen(360)*!dtor
> to begin with.
> Cheers
>
>
  David Fanning wrote:
>> David Fanning writes:
>>
>>
>>> Wox writes:
>>>
>>>
>>>> Specify x?
>>>>
>>> dx = DERIV(x * !dtor,data)
>>>
>>> Oh, sorry.
>>> x = findgen(360)
>>>
>>> David
>>>
>>
>> Oh, sorry. I misunderstood. Yes, this does it. Thank you!
>>
>> David
>> --
```

```
>> David Fanning, Ph.D.
>> Fanning Software Consulting, Inc.
>> Coyote's Guide to IDL Programming: http://www.dfanning.com/
>> Sepore ma de ni thui. ("Perhaps thou speakest truth.")
>
```

Subject: Re: Differentiation in IDL Posted by David Fanning on Mon, 16 Oct 2006 14:31:59 GMT View Forum Message <> Reply to Message

Allan Whiteford writes:

```
> Surely when you type:
> dx = DERIV(x * !dtor,data)
> you're actually doing:
> d/d(x*!dtor) (sin(x*!dtor))
> which is:
> cos(x*!dtor)
> i.e. you shouldn't need to divide the result by !dtor.
> Of course, declaring x as findgen(360)*!dtor to start with looks a lot > cleaner and is probably easier to follow, but I don't think what was > suggested by Wox gives the wrong answer.
```

I think Bradley was suggesting an alternative way of getting to the same answer. And, indeed it does. His explanation adds insight to the original problem.

Cheers,

David

--

David Fanning, Ph.D.

Fanning Software Consulting, Inc.

Coyote's Guide to IDL Programming: http://www.dfanning.com/

Sepore ma de ni thui. ("Perhaps thou speakest truth.")