

Re: sine and modulus ?

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- *From:* amy666 <tommy1729@xxxxxxxxxxxx>
 - *Date:* Mon, 20 Oct 2008 15:23:07 EDT
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quasi :

On Sun, 19 Oct 2008 15:54:30 EDT, amy666
<tommy1729@xxxxxxxxxxxx>
wrote:

quasi wrote :

On Sun, 19 Oct 2008 07:17:44 EDT, amy666
<tommy1729@xxxxxxxxxxxx>
wrote:

im thinking about a sine defined for modulus

algebra.

Sounds like fun.

$$\sin(a) \bmod p = b \bmod p$$

$$\cos(a) \bmod p = c \bmod p$$

$$b^2 + c^2 = 1 \bmod p$$

where the sine and cosine can be computed
by

their

taylor series expanded at 0 and mod p.

But regardless of the modulus, the coefficients of

the

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Taylor series are eventually all undefined

(division by 0).

huh ?

mod p is chosen such that all elements have

multiplicative inverses ...

All nonzero elements have multiplicative inverses.

What is the Taylor series for $\sin(x)$? (over the reals)

$$x - x^3/3! + x^5/5! - \dots$$

computing divisions and powers is no problem in modulus.

Now try it (mod 2). Next try (mod 3).

Do you see a problem?

i havent tried anything but there are only a few possible problems :

1) convergence problems

even the lim of the average might not converge

2) the taylor series might be considered not to be a sine at all since :

2a) $\sin^2 + \cos^2 \neq 1$

2b) sin is not periodic

2c) sin does not satisfy its addition formula's , multiplication formula's , ...

2d) the related addition formula's cannot be computed if $\sqrt{1-x^2}$ cant be computed ...

and the alike ...

i dont think a sine and cosine exists that get satisfies all the conditions ...

we probably will have to choose some ...

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most logical choices – seem to me – :

1) sine and cosine = its taylor series

or

2) sine and cosine = satisfies addition formula

(i believe it follows from both that $\sin^2 + \cos^2 = 1$)

but im also intrested in what others (like quasi) think of it ...

quasi

regards

tommy1729

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