Re: problem of arithmetic modulo

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- *From*: Helmut Richter <hhr−m@xxxxxx>
- *Date*: Tue, 22 Jan 2008 16:06:38 +0100

On Tue, 22 Jan 2008, Cat wrote:

> Date: Tue, 22 Jan 2008 15:49:40 +0100
> From: Cat <Ct@xxxxxxxxx>
> Newsgroups: sci.math
> Subject: Re: problem of arithmetic modulo
>
> Rainer Rosenthal <r.rosenthal@xxxxxx> a écrit dans le message :
> 5vmbh9F1mnj3lU1@xxxxxxxxxxxxxxxxxxxxx
>
>> Bill wrote:
>>
>>> but this is not the case with modulo 7.
>>> 10^0=1[7], 10^1=3 [7], 10^2=2[7], 10^3=6, 10^4=4,
>>> 10^5=5, 10^6=1 and so
>
> on
>
>>> [modulo 7]
>>
>> Please write some more terms of the "and so on". Won't be that random as
>> you seem to expect. Draw your conclusions.
>>
>> Regards,
>> Rainer
>
> I know it's not random.
> But how do you compute c modulo 7 with c =sum(a_i)
> where a_i are the digits of the numbre 3^1000?
> It does'nt seem as straightforward as with c modulo 3.
> I even wonder if it's possible to solve the problem.

The unfair solution is to compute 3^1000 which is

1322070819480806636890455259752144365965422032752148167664920368226828597346704
89954077831385060806196390977769687258235595095458210061891186534272525795367402
76202251983208038780147742289648412743904001175886180411289478156230944380615661
73054086674490506178125480344405547054397038895817465368254916136220830268563778
58229022841639830788789691855640408489893760937324217184635993869551676501894058
8109060426089671438864102814350385648747165832010614366132173102768902855220001,

then add up its digits, giving c=2142, then computing the desired values:

c = 0 (mod 2)
c = 0 (mod 3)
c = 0 (mod 7)
c = 0 (mod 17)

Conjecture: c = 0 (mod p) for all prime p.

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Helmut Richter
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