Re: problem of arithmetic modulo

Source: http://sci.tech−archive.net/Archive/sci.math/2008−01/msg03583.html

- *From*: Carl Barron <cbarron413@xxxxxxxxxxxx>
- *Date*: Tue, 22 Jan 2008 22:55:32 −0500

In article
<Pine.LNX.4.63.0801221602130.7864@xxxxxxxxxxxxxxxxxxxxxxxxxxx>, Helmut
Richter <hhr−m@xxxxxx> wrote:

> 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

899540778313850608061963909777696872582355950954582100618911865342725257953674
02

762022519832080387801477422896484127439040011758861804112894781562309443806156
61

730540866744905061781254803444055470543970388958174653682549161362208302685637
78

582290228416398307887896918556404084898937609373242171846359938695516765018940
58

810906042608967143886410281435038564874716583201061436613217310276890285522000
1,

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.

c is an integer and has a unique factorization any prime p not in
that factorization fails your conjecture the smalles such prime is 5
if your calculations of 3^1000 are correct.
c = 2(mod 5) −><−
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