

Re: problem of arithmetic modulo

Source: <http://sci.tech-archive.net/Archive/sci.math/2008-01/msg03593.html>

- *From:* William Elliot <marsh@xxxxxxxxxxxxxxxxxxxxx>
 - *Date:* Tue, 22 Jan 2008 21:19:25 -0800
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On Tue, 22 Jan 2008, Bill wrote:

We have $3^{1000} = \sum(a_i 10^i)$ where a_i are the digits of 3^{1000} expressed in decimal system.

let 's say $c = \sum(a_i)$ the sum over all digits.
the value of c modulo 3 equals 0 and it's easily solved.

But what 's about c modulo 7 ?

Let $d_j = a_j$.

$$3^{1000} = \sum_j d_j \cdot 10^j = 3 * \sum_j d_j \pmod{7}$$

$$3^6 = 1 \pmod{7}$$

$$3^{1000} = (3^6)^{166} * 3^4 = 3 * 3^3 = 3 * 27 = -3 \pmod{7}$$

$$\sum_j d_j = -1 = 6 \pmod{7}$$

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