Re: FLTMA: Verification of "large zero"

Source: http://sci.tech−archive.net/Archive/sci.math/2005−03/6354.html

---

From: richard miller (*richard_at_microscitech.freeserve.co.uk*)
Date: 03/18/05

```
Date: Fri, 18 Mar 2005 15:39:07 -0000
```

<DGoncz@aol.com> wrote in message
news:1111152278.966173.50660@l41g2000cwc.googlegroups.com...
>
> richard miller wrote:
> > <DGoncz@aol.com> wrote in message
> > news:1110923062.398760.6430@o13g2000cwo.googlegroups.com...
> > > Can any reader here verify that
> > >
> > > for n=546, a=49, b=51, and c=53,
> > >

snip

> >
> > My money is on Doug studying cubic exponent residues, i.e. x^3 mod A,
> where
> > A is 49, 51 or 53.
>

snip

> No money. I wasn't looking at cubic exponent residues at all.
>

Guess I go hungry!

A short correction on my post

Wrong: 49^13 = −11 * −11 * −11 * −11 * 49 = +1 mod 53
Right: 49^13 = −11 * −11 * −11 * −11 * 49 = +23 mod 53
and +23^2 = −1 mod 53 hence 49^26 = −1 mod 53.

Results still hold and, without the extra square bit to take 23^2 = −1 mod
53, I wouldn't have needed the 2 to combine all the powers, i.e. 546/2 = 273
would suffice. As Doug Mentions, we need that 2.

> I have been looking at the series

>
> S.n=
> (a^n + b^n) mod c +
> (c^n − a^n) mod b +
> (c^n − b^n) mod a
>
> and wondering if its lattice representation tests out differently for
> those series having a zero.
>
> I have been looking at George Marsaglia's classic paper on linear
> congruential sequences, and have programmed a few of the definitions
> and functions in Mathcad.
>
> In this case S(49,51,53) has a zero S.546.
>

I'm not familiar with this at all, I'll have to start looking now. More
papers to read, sigh.

> This is related to Fermat's Last Theorem, and FLTMA stands for Fermat's
> Last Theorem and Modular Arithmetic, a flag or tag I propsed a while
> ago here.

>
> The most important thing, though is that 546 is even. If it were
> possible to prove that S.n = 0 ==> n == 0 mod 2, then that would open
> up an exploration into FLT.

>From my residue relations, it has no choice but to be even.

>
> The additional conditions are only 0 < a < b < c < (a+b).
>
> Can anyone here verify as expected that
>
> 49^546 + 51^546 − 53^546? != 0?
>

Yep, verified. In fact, 53^546 is 10^9 times bigger − check this with logs,
see below though.

> Yours,
>
> Doug Goncz
> Replikon Research
> Seven Corners, VA 22044−0394
>

This opens up another interesting avenue.

Regards

Richard Miller

****
RESULTS

53^546 / (49^546 + 51^546) > 10^9 with NON−ZERO remainder, i.e. (49^546 + 51^546) does not divide 53^546. I don't know if this is expected or not. I would not think so because the moduli in question are 49, 51 and 53, whereas for FLT, we're talking these numbers raised to 546. Comments welcome.

The quotient is 1322235010 which has been verified by logs. Last digit checks and back calculation checks have also been performed (not shown).

Actual numbers are shown below.

The 'size' refers to number of 4 decimal digit blocks. I split my numbers into arrays, each element 0<x<10^4. Note, there can be leading zeros to pad out to 4−digit blocks.

I'm not sure how this will come out on sci.math so I will email you a text file attachment

49^546 =
0703 1689 6671 7215 1417 2895 1273 6239 0819 8131 1003 5272 1269 2611 1280
5813 0881 1855 2638 1634 9741 6524 6003 6018 2097 9175 4951 7681 6408 3791
8203 5048 6561 6743 3644 9788 9467 7199 9316 7364 4631 0885 5427 5611 9714
8561 1242 1630 1027 3151 5821 8353 9972 2948 9119 8370 4797 0253 3783 2093
0561 0218 2327 2220 5008 5508 0727 4925 8643 9423 2082 3046 3865 4997 3894
4732 0221 6072 4409 4311 9478 9903 7804 5430 3882 2239 5063 2505 5583 3663
5066 0276 7637 4051 5321 6787 1476 2061 8858 2651 5632 9580 3285 3755 9070
3173 1095 2018 2930 7427 0967 5990 0388 4997 2506 1783 1046 5764 1553 6053
8480 5627 3771 6414 8287 9738 9960 1915 5887 6422 1369 3988 3755 5185 7099
1629 5838 4105 7629 0588 1102 3113 4619 4198 8797 1217 3365 4617 8777 0928
5356 3424 3133 7473 2811 6362 9402 1865 5952 8936 2485 7416 3850 6730 3353
4294 9470 4632 0450 9506 8003 1716 9401 1421 5078 2206 8684 7176 6515 4195
5427 8746 7700 2666 2504 9802 4360 0335 1991 5837 3705 0857 4281 9658 1307
1618 8632 2954 6408 0849 6124 3927 7742 8435 8767 1537 9951 8405 2319 1147
6924 9456 1285 2869 0521 1565 9523 1928 7711 4257 3068 9711 7443 3705 9240
7303 5204 4103 4801 6193 5201 (size 231)

51^546 =
0002 1543 4944 6554 4931 1713 2175 6225 9198 3117 3068 0541 7135 9757 6088
9283 5902 4063 0059 1594 3970 7572 7513 8730 4998 9074 8803 8666 6790 9465
5648 5200 6206 5805
8542 4259 0311 0075 0639 0237 1761 0093 5087 4863 7568 4312 2519 4328 8198
0626 8111 9680 7044 6591 9625 8538 9983 0130 2594 8035 8238 5450 7736 2810
9559 0698 8175 5988 3575 9598 8607 6574 9420 0100 7305 5121 5326 2035 7908
4655 2894 9948 3619 3701 1857 0859 7766 5624 0185 5217 2989 7215 4067 6753
6462 5216 6054 0943 7981 8629 3854 0431 1254 4660 5319 6928 7621 3944 9618
0218 9592 9663 7017 7700 4744 9022 2512 7346 7844 9988 4799 7880 2482 9581
2564 3990 1768 5368 4642 9934 3839 4878 8651 8739 1404 2297 3512 4643 7327

4789 2355 3345 8202 4940 2428 7528 2227 3017 4669 6488 2192 1423 0997 3362
7522 1543 9852 8693 2746 3162 5794 3665 0416 7082 3590 0095 4922 3974 5284
2602 9979 2796 2314 9100 8890 1294 7888 9073 4491 9266 6238 3992 2681 7606
0263 4998 3608 9302 6001 6691 4151 5668 7730 7419 8184 6599 8205 2033 8501
8345 7822 5084 5208 4284 8432 3015 3932 0334 9629 7086 7945 9939 5420 8977
1900 1650 4920 4387 9049 4496 0573 4055 6805 9774 6730 2902 3230 2248 7056
4093 9913 4150 8198 9801 (size 234)

53^546 =
0028 4855 6264 4786 6058 3509 4244 1320 9696 6118 4814 4117 7893 7078 5742
9330 0189 3716 1933 9339 1869 2607 0219 2132 2250 1404 2793 0224 3847 2699
3202 8396 7820 6123 5754 4803 3800 2052 2696 0674 1556 4490 2715 6658 0310
5400 7809 2545 7785 5958 4634 0189 5607 4071 4889 8809 5837 4004 4298 0581
4587 9783 3082 0326 3721 5466 9971 9043 4983 6445 9078 7988 6376 9983 9571
4696 9750 8120 1807 7836 8776 4116 2564 4155 3243 3746 6543 8335 0294 4596
6214 1178 9657 5664 0794 7549 9491 1042 4844 4201 1980 5315 7765 5514 9238
1197 3063 8166 6973 0811 5718 0242 9011 0857 7941 5312 0851 1654 0098 5272
7799 5859 7962 8184 4069 7187 1902 8056 2491 4936 4340 8450 6470 1453 3383
9062 0792 6715 5852 0178 3504 4090 6360 6601 5691 6119 1553 2329 8968 0924
2731 7239 9320 7120 0206 4229 2352 8432 2523 4582 6685 1401 7013 5582 8418
8643 2735 0647 3726 4953 4274 1981 1927 7636 9596 9003 7188 7432 0149 9435
9286 0119 0403 1482 0310 9417 1909 6869 1568 3054 6071 4984 6551 4870 6742
6549 4716 6796 4189 5769 9636 3404 9015 9695 4501 1294 3939 9437 7640 6401
1455 1428 4867 1746 1074 7738 0478 9655 6941 9855 3428 8512 5205 8098 7372
7330 2338 1201 2918 3550 6379 5076 0703 0261 9670 2329 (size 236)

49^546 + 51^546 =
0002 1543 4944 7257 6620 8384 9390 7643 2093 4390 9307 1361 5267 0761 1361
0552 8513 5343 5872 2475 5826 0210 9148 8472 1523 5078 4822 0764 5966 4417
3330 1608 9998 4009 3591 0820 7054 3720 0427 9704 8960 9410 2451 9494 8453
9739 8131 4043 6759 1868 9742 0708 0196 2413 7979 8511 2931 9250 0965 2832
8491 9233 9829 3371 9777 3026 0396 0996 9084 0326 3533 5218 8843 2183 0351
8987 0323 5930 2640 4876 8967 4357 7931 3180 1760 8664 3196 9506 2425 0280
5495 2798 7731 1819 6739 2854 0105 6265 4769 0105 5915 9289 3906 0293 4900
0214 1377 3015 2791 1314 1611 2594 4444 8668 0734 9410 7509 9852 9628 1035
0563 9433 8536 8061 8191 7761 8183 3656 4381 9894 5755 0766 5074 0108 5392
6052 8698 1742 8957 0627 6461 0974 8790 6042 5542 2147 6426 1814 5886 9853
6810 0200 1925 8719 0946 4677 7326 1504 9109 2564 7659 9617 9352 9568 1006
3946 1652 7327 9579 2073 4611 3247 1821 7104 0607 0695 9310 4151 6698 7951
3415 0507 6877 3033 9010 2698 6275 1807 5804 1051 4486 7660 3568 1124 9042
0881 7863 3341 0120 6978 0777 1492 6058 0409 2360 0758 2367 9102 1167 7038
6351 2258 6568 5902 1356 2935 7789 4909 0615 4019 2502 1767 1063 2843 6442
0345 6936 1489 4359 9298 4016 8952 4392 5002 (size 234)

quotient 53^546 / (49^546 + 51^546) = 0013 2223 5010 (size 3)

remainder =
0001 5404 3128 5494 2043 7745 3898 2842 4652 8091 3995 7224 7992 3225 1637
8877 3993 1778 2950 5951 4054 7423 3125 3142 7865 7612 7982 1244 8306 3693
6928 6467 4276 4269 6344 0088 5073 5717 6948 0455 7550 7212 9100 6423 6086
7402 2488 7172 9731 0801 1353 9269 2109 5825 8063 4504 9840 4946 0699 9621

3620 3619 5730 7576 3650 5095 6304 3887 6656 0093 6890 6519 7585 8588 4358
6647 3303 4010 2014 9602 5229 8949 4917 4022 2259 9690 9669 3837 1723 3234
6127 3737 4827 2449 9832 6190 5503 1278 7600 4429 7867 8749 3902 5281 0023
4396 7442 2493 9823 0738 1367 9067 0477 2150 1067 1005 6770 5199 2739 3941
0171 2453 6753 6251 0198 2190 8601 6389 0116 3127 3628 0314 1202 8831 5234
3138 7099 8560 9368 3890 4828 2391 0117 4659 7307 3649 3437 4968 5671 9021
1055 9593 6736 6756 6709 7395 4672 1759 8255 8795 8346 3718 7134 3943 6887
1070 8955 0351 3194 0752 7022 7239 2608 9096 7679 9792 8723 4780 8094 5640
3004 0280 3525 4660 9831 3519 9208 0882 1806 3561 2494 9945 2289 8754 1420
5422 0246 8273 2570 6228 8680 9395 3303 4716 3616 8479 5224 7488 1806 9728
8839 7171 4358 4832 7948 1547 0748 5168 2943 6757 7200 4247 5150 5535 9098
0854 5116 8473 0564 4143 7682 8987 3798 2309 (size 234)