

Primality-testing Mersenne Numbers (II)

Article

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*86T-11-857 G M^cC HAWORTH: 33, Alexandra Rd., Reading, Berks UK, RG1 5PG.
Primality-testing Mersenne Numbers (II). Preliminary Report.

$M_p = 2^p - 1$, index p prime, is a Mersenne Number. Let $S_1 = 4$ and let $S_{n+1} = S_n^2 - 2 \pmod{M_p}$. The M_p Lucas-Lehmer primality test (M_p -LLT) is " M_p prime \Leftrightarrow residue $S_{p-1} = 0$ " for $p > 2$.

Codes A and B exercised M_p -LLT [AMS Abstracts, v4 no2 (Feb '83) p196, 83T-10-82] over the $p < 62982$ range, including all M_p for which no factor was known. By November '84, Code C had extended the coverage, testing the 1362 M_p for which no factor was known in the range $62982 < p < 100000$. The three codes run on the ICL DAP at QMC London and use Fast Fermat-number-transform multiplication.

Code C tested 16 M_p in parallel and checked the squaring modulo $2^{16} - 1$ without signalling any faults. It confirmed M_{86243} prime in effectively 2318 seconds and also confirmed 520 other known M_p -LRs.

The consolidated and filed results comprise:

- a) $M_{50021} - f_1$, $M_{50023} - f_1$ and 2620 $M_p - f_1$ for $50024 < p < 100000$
- b) the previous 2828 second-sourced M_p -LRs for $p < 50024$
- c) 1837 single-sourced M_p -LRs for $50024 < p < 100000$
- d) references to $M_p - f_1$ tables for $p < 50000$ and to known M_p -LR sources.

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