79.62 A Large Pair of Twin Primes
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multiply the interval by a given reduction factor, can be confirmed by numerical experiments. Hence, whichever way we look at this problem, bisection with $\alpha = \frac{1}{2}$ is the most efficient process.

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79.62 A large pair of twin primes

I am pleased to report that the 4622 digit numbers

$$6797727 \times 2^{15328} - 1 \quad \text{and} \quad 6797727 \times 2^{15328} + 1$$

are twin primes. They were discovered by my computer (more precisely, a computer on loan to me by the M500 Society) at about 4 a.m. on Tuesday 18th July 1995, but I had left the machine unattended for some time; it was not until the 19th that I became aware of them.

The computer power was modest by today's standards for this type of work; a 33 MHz 486 microprocessor, later upgraded to 100 MHz. Efficiency was therefore important. I used the best algorithms known to me and programmed everything from scratch in a combination of Yuji Kida's UBASIC and PC assembler language. For instance, we are well out of the range where one can effectively multiply numbers together in the way we were taught at school. Instead, I had to use the more sophisticated Schönhage-Strassen method, based on the Fast Fourier Transform modulo F_8, the eighth Fermat number.

But the main requirement was a great deal of patience. I decided to search through multiples of 2^{15328}, the upper limit of my computer program. About 229 out of every 230 candidates were eliminated fairly quickly by a combination of the sieve of Eratosthenes together with straightforward trial division by primes up to about a million. That left over 30,000 numbers to be examined using the Fermat test, each taking 8.5 minutes at 33 MHz, reducing to 2.8 minutes after the 100 MHz upgrade.

An account will appear in M500, the periodical of the M500 Society, the mathematics society of the Open University.

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Editor's Note: The largest pair of twin primes known to Paulo Ribenboim of *Prime Number Records* fame have 4932 digits and are the subject of a paper by Indlekofer and Ja'rai to appear in *Math. Comp.* Tony Forbes' twin primes have been verified by Harvey Dubner (70372.1170@compuserve.com) who is an expert in the field.

East meets West

'The rain is coming down horizontally.'

Heard on a *Radio 5 live* broadcast from Red Square, Moscow by Tim Cross who would like to know which component of velocity that is.