$$U_p \equiv 5^{\frac{p-1}{2}} \equiv \epsilon_p \pmod{p}$$

$$V_p \equiv 1 \pmod{p}$$

Hence $m = U_{2p} \equiv \epsilon_p \pmod{p}$ and, since U_{2p} is odd, 2p divides $m - \epsilon_p$, hence U_{2p} divides $U_{m-\epsilon_p}$. It remains to show that $\epsilon_m = \epsilon_p$ or that $m \equiv p \pmod{10}$. Taking (3) modulo 5 we have

$$4^{p-1} U_p V_p \equiv (-1)^{p-1} U_{2p} = U_{2p} \equiv p \pmod{5}, \text{ and}$$

since $m = U_{2p}$ and p are both odd $(p \neq 3)$ we have $m = p \pmod{10}$ or $\epsilon_p = \epsilon_m$ and the result follows.

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TWO VERY SPECIAL NUMBERS

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Stimulated by my derivation of the two 17-digit automorphic numbers (Recreational Mathematics Magazine, No. 14), Mr. R. A. Fairbairn of Willowdale, Ontario, has derived the two 100-digit automorphics.

The labor involved in this tremendous task would deter most enthusiasts, since the results were achieved (and of course checked) using no help other than a simple desk adding machine.

An automorphic number is distinguished by having its square end with the number itself.

The two 100-digit automorphic numbers, never before published so far as I know, are:

3, 953, 007, 319, 108, 169, 802, 938, 509, 890, 062, 166,
509, 580, 863, 811, 000, 557, 423, 423, 230, 896, 109,
004, 106, 619, 977, 392, 256, 259, 918, 212, 890, 625

and

6, 046, 992, 680, 891, 830, 197, 061, 490, 109, 937, 833,
490, 419, 136, 188, 999, 442, 576, 576, 769, 103, 890,
995, 893, 380, 022, 607, 743, 740, 081, 787, 109, 376