Four New Factors of Fermat Numbers

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Using a System 370, Model 158, IBM Computer, I was able to extend the research of R. M. Robinson [1] and others [2] and [3] concerning the exploration of factors of Fermat Numbers. I wrote my own arithmetic routines to operate on a bit string with a length of 1024 bites (128 8-bit BYTES). Thus, I was able to test possible factors which were larger than the $2^{32} - 1$ fixed word maximum.

I tested numbers of the form $K \cdot 2^n + 1$, where $23 \leq n \leq 100$ and $3 \leq K \leq 29999$, $K$ is odd; and $101 \leq n \leq 256$ and $101 \leq K \leq 293$, $K$ is odd. I refound all previously found factors within these ranges, as well as:

- $697 \cdot 2^{64} + 1$ divides $F_{62}$
- $7551 \cdot 2^{69} + 1$ divides $F_{66}$
- $683 \cdot 2^{73} + 1$ divides $F_{71}$
- $1421 \cdot 2^{93} + 1$ divides $F_{91}$

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