On Kurepa's left factorial conjecture

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Kurepa's conjecture states that there is no odd prime p that divides $!p = 0! + 1! + \cdots + (p-1)!$. We introduce new optimization techniques and perform the computation of $!p$ modulo p for all $p < 2^{40}$. Additionally, we consider the generalized Kurepa's left factorial given by $!^k n = (0!)^k + (1!)^k + \cdots + ((n-1)!)^k$, and show that for all integers $1 < k < 100$ there exists an odd prime p such that $p \mid !^k p$. We also investigate the existence of primes $p > 5$ for which the residues of $2!$, $3!$, $\ldots$, $(p-1)!$ modulo p are all distinct. We describe the connection between this problem and Kurepa's left factorial function, and report that there are no such primes less than 2^{40}.

References

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