Ronald Evans and Jonathan Pearlman
Nonexistence of odd perfect numbers of a certain form,
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Abstract

Write $N = p^\alpha q_1^{2\beta_1} \cdots q_k^{2\beta_k}$, where $p, q_1, \ldots, q_k$ are distinct odd primes and $p \equiv \alpha \equiv 1 \pmod 4$. An odd perfect number, if it exists, must have this form. McDaniel proved in 1970 that N is not perfect if all β_i are congruent to $1 \pmod 3$. Hagis and McDaniel proved in 1975 that N is not perfect if all β_i are congruent to $17 \pmod{35}$. We prove that N is not perfect if all β_i are congruent to $32 \pmod{65}$. We also show that N is not perfect if all β_i are congruent to $2 \pmod 5$ and either $7|N$ or $3|N$. This is related to a result of Iannucci and Sorli, who proved in 2003 that N is not perfect if each β_i is congruent either to $2 \pmod 5$ or $1 \pmod 3$ and $3|N$.