

Title: A consequence of the ternary Goldbach theorem

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Let

$$\mathcal{M}_k = \{p_1 + p_2 + \cdots + p_k \mid p_1, p_2, \dots, p_k \in \mathbb{P}\},$$

where $\mathcal{P}$ is the set of primes. We proved that if an integer $k \geq 3$ and arithmetical functions f, g satisfy the functional equation

$$f(p_1 + p_2 + \cdots + p_k) = g(p_1) + g(p_2) + \cdots + g(p_k)$$

for all $p_1, p_2, \dots, p_k \in \mathbb{P}$, then there are two constants A and B such that $f(n) = An + kB$ for all $n \in \mathcal{M}_k$ and $g(p) = Ap + B$ for all $p \in \mathcal{P}$.

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