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Translation invariance and finite additivity in a probability measure on the natural numbers. (English summary)

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Summary: "Inspired by the 'two envelopes exchange paradox', a finitely additive probability measure m on the natural numbers is introduced. The measure is uniform in the sense that $m(\{i\}) = m(\{j\})$ for all $i, j \in \mathbb{N}$. The measure is shown to be translation invariant and has such desirable properties as

$$m(\{i \in \mathbb{N} | i \equiv 0 \pmod 2\}) = 1/2.$$

For any $r \in [0, 1]$, a set A is constructed such that $m(A) = r$; however, m is not defined on the power set of $\mathbb{N}$. Finally, a resolution to the two envelopes exchange paradox is presented in terms of m."