Frequency Deviations in Nested Collatz Sequences

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Abstract. Let 1 denote the indicator function and let C(x) be the Collatz sequence of $x \in \mathbb{N}$. We define:

$$\sigma(a,b,n) = \sum_{i=1}^{n} \mathbb{1}_{C(ai+b)}(i)$$

We observe experimentally over many *b* values that some $\sigma(a, b, n)$ are significantly larger than their peers. This is notably the case for $a = 7, 11, 101, \ldots$ etc.

1 The Task

Your task will be to study if this is a computational artefact and if not try to find an explanation of the phenomenon.