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Binary operations on the natural numbers spanned by their addition and multiplication. Let S be any set and $*$ and \circ be two arbitrary operations on S . An operation \star on S is said to be a two-option operation spanned by $*$ and \circ if for all $a, b \in S$, $a \star b \in \{a * b, a \circ b\}$. Any two-option operation may be represented by a graph having the elements of S are vertices and such that there is an edge between a and b precisely when $a \star b = a * b$. Two-option operations were motivated by graph magmas and two-valued magmas studied earlier in other projects. We are interested in learning what associative operations may be spanned by two given operations $*$ and \circ . Interestingly, $*$ and \circ need not be associative themselves to yield \star associative. As an initial experiment, we aim to produce an exhaustive list of associative two option operations on the set of natural numbers for $*$ and \circ being, respectively, the usual addition and multiplication of natural numbers.

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