Problem 93 - Arithmetic Expressions

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Note that for the set $\{1, 2, 3, 4\}$, the integers from 1 to 28 can be created using combinations of the basic arithmetic expressions and brackets. Our goal is to determine the the set of four digits $\{a, b, c, d\}$ such that the integers from 1 to N can be created, where N is maximal over all possible sets.

This seems straightforward to brute force, but let's first look at a few simple cases to see how this function behaves.

$$3 * 1 - 4/2 = 1$$

$$2 * 3 - 4 * 1 = 2$$

$$(4 + 2)/(3 - 1) = 3$$

It doesn't seem like there's an obvious way to compute N analytically, but we just need to iterate over all possible strings, and then compute our desired value.