Fuck

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An operation $*$ on a set S is something that takes in two values of S and spits out one value of S. For instance,

1. Addition, subtraction, multiplication, and division are operations on rational numbers $\mathbb{Q}$.
2. Exponentiation is an operation on positive integers: let $a * b = a^b$.
3. Logic gates are an operation: they take in two numbers (each either 0 or 1) and spit out 0 or 1.

An operation $*$ on S is called **closed** if for all $a, b \in S$, the element $a * b \in S$ too. In other words, $*$ never "leaves" S. The operation $*$ is associative if for all $a, b, c \in S$, we have $a * (b * c) = (a * b) * c$. Furthermore, $*$ is **commutative** if $a * b = b * a$ for all $a, b \in S$. It's possible to have one of these without the other!