



# Associative Operations

## 1 Why

We name operations for which we the first two or the second two elements in an ordered list of three elements.

## 2 Definition

An operation *associates* if given any three elements in order it doesn't matter whether we first operate on the first two and then with the result of the first two the third, or the second two and with the result of the second two the first.

### 2.1 Notation

Let  $A$  be a non-empty set and let  $+: A \times A \rightarrow A$  be an operation. If  $+$  associates, then

$$(a + b) + c = (a + b) + c$$

for all  $a, b, c \in A$ .



Associative Operations



Operations



Functions



Relations



Ordered Pairs



Empty Set

Unordered Pairs



Set Specification



