



## PAIR UNIONS

### Why

We often unite the elements of one set with another.

### Discussion

Let  $A$  and  $B$  denote sets. We call  $\cup\{A, b\}$  the *pair union* of  $A$  and  $B$ . We denote the union of the pair  $\{A, B\}$  by  $A \cup B$ . Clearly the pair union does not depend on the order of  $A$  and  $B$ . In other words,  $A \cup B = B \cup A$ .

### Facts

Here are some basic facts about unions of a pair of sets.<sup>1</sup> Let  $A$  and  $B$  denote sets.

**Proposition 1** (Identity Element).  $A \cup \emptyset = A$

**Proposition 2** (Commutativity).  $A \cup B = B \cup A$

**Proposition 3** (Associativity).  $(A \cup B) \cup C = A \cup (B \cup C)$

**Proposition 4** (Idempotence).  $A \cup A = A$ .

**Proposition 5.**  $A \subset B \longleftrightarrow A \cup B = B$

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<sup>1</sup>Proofs will appear in the next edition.



