

Lemma. Given a set \mathbf{A} and a family of subsets of \mathbf{A} , denoted $\{\mathbf{A}_i\}_{i \in \mathbf{I}}$ (with index set \mathbf{I}), one has:

$$\bigcup_{i \in \mathbf{I}} \bigcup \{\mathbf{A}_i\} = \bigcup_{i \in \mathbf{I}} \{\mathbf{A}_i\}.$$