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left identity and right identity

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Let G be a groupoid. An element $e \in G$ is called a *left identity element* if $ex = x$ for all $x \in G$. Similarly, e is a *right identity element* if $xe = x$ for all $x \in G$.

An element which is both a left and a right identity is an identity element.

A groupoid may have more than one left identity element: in fact the operation defined by $xy = y$ for all $x, y \in G$ defines a groupoid (in fact, a semigroup) on any set G , and every element is a left identity.

But as soon as a groupoid has both a left and a right identity, they are necessarily unique and equal. For if e is a left identity and f is a right identity, then $f = ef = e$.