



## Why

We want to visualize function composition.

## Definition

A *composition graph* (or *composition diagram*) is a directed graph along with a map from vertices to the powerset of a set and a map from edges to functions between sets associated with incident vertices.

## Example

For example, let  $A$  and  $R$  be sets and let  $i : A \rightarrow A$ ,  $f : A \rightarrow R$  and  $g : R \rightarrow A$  be functions. We can consider the diagram whose graph is  $(\{1, 2, 3\}, \{(1, 2), (2, 3), (1, 3)\})$ , with vertices one and three corresponding to  $A$ , vertex 2 corresponding to  $R$ , edge  $(1, 2)$  corresponding to  $f$ , edge  $(2, 3)$  corresponding to  $g$  and edge  $(1, 3)$  corresponding to  $i$ .<sup>1</sup>

## Path composition

The function associated with a path (or *path composition*) is the composition of the functions corresponding to the edges along the path. The digram is *commutative* (call a *commutative diagram*) if the composition of any two paths between any two vertices result in identical functions.

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<sup>1</sup>Future editions will include the highly important figures associated with function diagrams.



