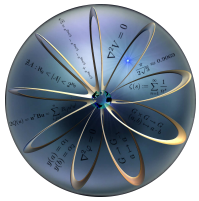

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generalized Cartesian product

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Defines	projection map

Given any family of sets $\{A_j\}_{j\in J}$ indexed by an index set J, the *generalized Cartesian product*

$$\prod_{j\in J} A_j$$

is the set of all functions

$$f\colon J \to \bigcup_{j\in J} A_j$$

such that $f(j) \in A_j$ for all $j \in J$.

For each $i \in J$, the *projection map*

$$\pi_i\colon \prod_{j\in J} A_j \to A_i$$

is the function defined by

$$\pi_i(f) := f(i).$$

The generalized Cartesian product is the `http://planetmath.org/CategoricalDirectProduc` in the category of sets.

The axiom of choice is the statement that the generalized Cartesian product of nonempty sets is nonempty. The generalized Cartesian product is usually called the Cartesian product.