

# Destructing of Nilsen Cartesian Products

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When you have a path:

$$f[g] \Leftrightarrow h$$

$$\begin{aligned} f &: A \rightarrow A \\ g &: A \rightarrow B \\ h &: B \rightarrow B \end{aligned}$$

The function `g` can also be a tuple of functions applied by duplicating the arguments:

$$f[g \text{ . dup}] \Leftrightarrow h$$

$$\begin{aligned} f &: A \rightarrow A \\ \text{dup} &: A \rightarrow (A, A) \\ g &: (A \rightarrow B, A \rightarrow C) \\ h &: (B, C) \rightarrow (B, C) \end{aligned}$$

A general structure of this kind can be represented in the asymmetric form  $g_{i \rightarrow n}$ :

$$f[g_{i \rightarrow n}] \Leftrightarrow h$$

It means that, although the same notation is used, there is a wider interpretation and the usage must be interpreted by “what would logically fit here” when solving a specific problem.

For example, a variable might have more than one sub-type:

$$a : [g_0] b_0 \wedge [g_1] b_1$$

This is the same as:

$$a : [(g_0, g_1) \text{ . dup}] (b_0, b_1)$$