$$f+g : \mathbf{A} + \mathbf{B} \to \mathbf{P}$$

$$\mathbf{x} \mapsto \begin{cases} f(\mathbf{x}), & \text{if } \mathbf{x} = \iota_{\mathbf{A}}(a), \quad a \in \mathbf{A}, \\ g(\mathbf{x}), & \text{if } \mathbf{x} = \iota_{\mathbf{B}}(b), \quad b \in \mathbf{B}. \end{cases}$$