

## Definition (Dualizable object)

Let  $\langle \mathbf{C}, \otimes_{\mathbf{C}}, \mathbf{1}_{\mathbf{C}} \rangle$  be a monoidal category, and let  $X \in \mathbf{Ob}_{\mathbf{C}}$ . A *right dual object* of  $X$  is specified by:

### Constituents

1. an object  $X^{\vee} \in \mathbf{Ob}_{\mathbf{C}}$ ;
2. an evaluation map  $\text{ev}_X : X^{\vee} \otimes X \rightarrow \mathbf{1}$ ;
3. a coevaluation map  $\text{coev}_X : \mathbf{1} \rightarrow X \otimes X^{\vee}$ ;

### Conditions

1.  $\text{lu}_X^{-1} \circ (\text{coev}_X \otimes \text{Id}_X) \circ \text{as}_{X, X^{\vee}, X} \circ (\text{Id}_X \otimes \text{ev}_X) \circ \text{ru}_X = \text{Id}_X$ ;
2.  $\text{ru}_{X^{\vee}}^{-1} \circ (\text{Id}_{X^{\vee}} \otimes \text{coev}_X) \circ \text{as}_{X^{\vee}, X, X^{\vee}}^{-1} \circ (\text{ev}_X \otimes \text{Id}_{X^{\vee}}) \circ \text{lu}_{X^{\vee}} = \text{Id}_{X^{\vee}}$ .