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

## Constituents

- 1. an object  $X^{\vee} \in Ob_{\mathbf{C}}$ ;
- 2. an evaluation map  $\epsilon_X : X^{\vee} \otimes X \to 1$ ;
- 3. a coevaluation map  $\eta_X : \mathbf{1} \to X \otimes X^{\vee}$ ;

## Conditions

- 1.  $lu_X^{-1} \ \ (\eta_X \otimes Id_X) \ \ as_{X,X^{\vee},X} \ \ (Id_X \otimes \epsilon_X) \ \ ru_X = Id_X;$ 
  - 2.  $\operatorname{ru}_{X^{\vee}}^{-1} \circ (\operatorname{Id}_{X^{\vee}} \otimes \eta_X) \circ \operatorname{as}_{X^{\vee},X,X^{\vee}}^{-1} \circ (\varepsilon_X \otimes \operatorname{Id}_{X^{\vee}}) \circ \operatorname{lu}_{X^{\vee}} = \operatorname{Id}_{X^{\vee}}.$