Definition (Enriched category). Let $\langle \mathbf{V}, \boldsymbol{\otimes}, \mathbf{1}, \text{as}, \text{lu}, \text{ru} \rangle$ be a monoidal category. A category \mathbf{C} *enriched* in \mathbf{V} is composed of:

- 1. The set of objects $Ob_{\mathbf{C}}$;
- 2. For all $X, Y \in Ob_{\mathbb{C}}$, an object $Hom_{\mathbb{C}}(X; Y)$, called the *hom-object* from X to Y.
- 3. For all $X, Y, Z \in Ob_{\mathbb{C}}$, there exists a morphism $\S_{X,Y,Z}$ in \mathbb{V} :

$$\S_{X,Y,Z}$$
: $\operatorname{Hom}_{\mathbf{C}}(X;Y) \otimes \operatorname{Hom}_{\mathbf{C}}(Y;Z) \to \operatorname{Hom}_{\mathbf{C}}(X;Z)$.

This is called *composition morphism*.

- 4. For each $X \in \mathrm{Ob}_{\mathbb{C}}$, a morphism $\mathrm{Id}_X : 1 \to \mathrm{Hom}_{\mathbb{C}}(X;X)$, called *identity* element.
- Furthermore, for any $X, Y, Z, W \in \mathrm{Ob}_{\mathbf{C}}$, the following diagrams must commute.