Definition (Enriched functor). Given two categories C and D enriched in the same monoidal category V, an enriched functor $F: C \to D$ consists of:

- 1. A map $F: Ob_{\mathbb{C}} \to Ob_{\mathbb{D}}$ that maps objects of \mathbb{C} to objects of \mathbb{D} .
- 2. For each X, Y in $Ob_{\mathbb{C}}$, there exists a morphism in \mathbb{V} given by

$$F_{X,Y}: \operatorname{Hom}_{\mathbf{C}}(X;Y) \to \operatorname{Hom}_{\mathbf{D}}(F(X);F(Y)),$$

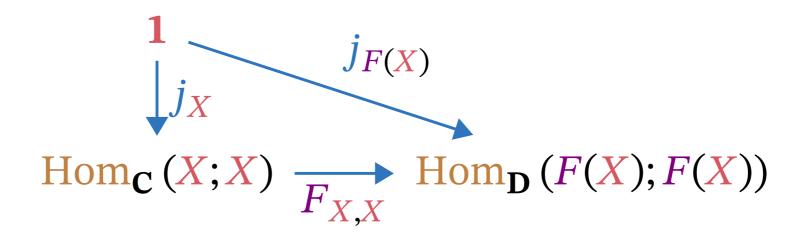
such that composing maps "across F" respects the composition in \mathbf{C} and the unit in \mathbf{V} in the obvious ways:

$$\operatorname{Hom}_{\mathbf{C}}(X;Y) \otimes \operatorname{Hom}_{\mathbf{C}}(Y;Z) \xrightarrow{m_{X,Y,Z}} \operatorname{Hom}_{\mathbf{C}}(X;Z)$$

$$\downarrow^{F_{X,Z}}$$

$$\operatorname{Hom}_{\mathbf{D}}(F(Y);F(Z)) \otimes \operatorname{Hom}_{\mathbf{D}}(F(X);F(Y)) \xrightarrow{m_{F(X),F(Y),F(Z)}} \operatorname{Hom}_{\mathbf{D}}(F(X);F(Z))$$

and



where \otimes and 1 are the monoidal product and monoidal unit in V.