**Definition** (Functor). A functor from category  $\mathbf{C}$  to category  $\mathbf{D}$  is a semi-functor  $F: \mathbf{C} \to \mathbf{D}$  that satisfies the condition

 $F_{\mathrm{mor}}(\mathrm{Id}_X) = \mathrm{Id}_{F_{\mathrm{ob}}(X)}$ .