

$$\begin{array}{ccc}
 c_1 = \langle X^*, Y \rangle & \xrightarrow{\text{Hom}_{\mathbf{C}}} & \text{Hom}_{\mathbf{C}}(X; Y) \\
 \downarrow f & & \downarrow \text{Hom}_{\mathbf{C}}(g) \\
 c_2 = \langle Z^*, U \rangle & \xrightarrow{\text{Hom}_{\mathbf{C}}} & \text{Hom}_{\mathbf{C}}(Z; U)
 \end{array}$$

The diagram illustrates a commutative square in the context of category theory. The top row shows the object $c_1 = \langle X^*, Y \rangle$ mapping via the Hom-functor $\text{Hom}_{\mathbf{C}}$ to the hom-object $\text{Hom}_{\mathbf{C}}(X; Y)$. The bottom row shows the object $c_2 = \langle Z^*, U \rangle$ mapping via the Hom-functor $\text{Hom}_{\mathbf{C}}$ to the hom-object $\text{Hom}_{\mathbf{C}}(Z; U)$. Vertical arrows represent the mapping of components: f maps c_1 to c_2 , f_1^* maps X^* to Z^* , f_2 maps Y to U , and $\text{Hom}_{\mathbf{C}}(g)$ maps the hom-object $\text{Hom}_{\mathbf{C}}(X; Y)$ to $\text{Hom}_{\mathbf{C}}(Z; U)$.