

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

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 to the hom-object $\text{Hom}_{\mathbf{C}}(X; Y)$ via the $\text{Hom}_{\mathbf{C}}$ functor. The bottom row shows the object $c_2 = \langle Z^*, U \rangle$ mapping to the hom-object $\text{Hom}_{\mathbf{C}}(Z; U)$ via the same functor. Vertical arrows represent natural transformations: f from c_1 to c_2 , f_1^* from X^* to Z^* , f_2 from Y to U , and $\text{Hom}_{\mathbf{C}}(g)$ from $\text{Hom}_{\mathbf{C}}(X; Y)$ to $\text{Hom}_{\mathbf{C}}(Z; U)$.