$$
\begin{tikzcd}
c_1 = \langle X^*, Y \rangle \arrow[r, "\mathrm{Hom}_{\mathbf{C}}"] \arrow[d, "f"'] \arrow[d, shift right=6, "f_1^*"'] \arrow[d, shift left=6, "f_2"] & \mathrm{Hom}_{\mathbf{C}}(X; Y) \arrow[d, "\mathrm{Hom}_{\mathbf{C}}(g)"] \\
c_2 = \langle Z^*, U \rangle \arrow[r, "\mathrm{Hom}_{\mathbf{C}}"] & \mathrm{Hom}_{\mathbf{C}}(Z; U)
\end{tikzcd}
$$