Example

Given that $\alpha = \cos^{-1}\left(\frac{4}{5}\right)$, find $\csc \alpha$.

Given that $\alpha = \cos^{-1}\left(\frac{4}{5}\right)$, we sketch a right triangle, label one of its acute angles $\alpha$, and use the fact that

$$\cos \alpha = \frac{4}{5} = \frac{\text{adjacent}}{\text{hypoteneus}}$$

to label the side of the triangle adjacent to $\alpha$ as 4 and the hypoteneus 5.

Using the Pythagorean theorem, we find that the leg opposite to $\alpha$ is $\sqrt{5^2 - 4^2} = 3$. Therefore,

$$\csc \alpha = \frac{1}{\sin \alpha} = \frac{\text{hypoteneus}}{\text{opposite}} = \frac{5}{3}.$$