Several programming languages include notation for no inverse trigonometric functions except the arctangent. To compute the others, you must use formulas expressing them in terms of the inverse tangent. These notes present such formulas.

If \( \theta = \arcsin t \), then \( t = \sin \theta \) and \(-\frac{1}{2}\pi \leq \theta \leq \frac{1}{2}\pi\), so \( \cos \theta \geq 0 \) and

\[
\cos \theta = \sqrt{1 - \sin^2 \theta} = \sqrt{1 - t^2}.
\]

Since \( \theta \) is in the range of the arctangent, it’s the arctangent of the right-hand member of the previous equation. That is,

\[
\arcsin t = \arctan \frac{t}{\sqrt{1-t^2}}.
\]

If \( \theta = \arccsc t \), then \( t = \csc \theta \) and \( 0 \leq \theta < \frac{1}{2}\pi \) or \( \pi < \theta < \frac{3}{2}\pi \). In the first case \( t \geq 1 \), \( \tan \theta \geq 0 \), and

\[
\tan \theta = \sqrt{\sec^2 \theta - 1} = \sqrt{t^2 - 1}
\]

\[
\theta = \arctan \sqrt{t^2 - 1}.
\]

In the second case, \( t \leq -1 \) and \( \theta = \pi + \arccsc(-t) \). Therefore,

\[
\arccsc t = \begin{cases} 
\arctan \sqrt{t^2 - 1} & \text{if } t \geq 1 \\
\pi + \arctan \sqrt{t^2 - 1} & \text{if } t \leq -1 
\end{cases}.
\]

The inverse cosine, cotangent, and cosecant are defined so that

\[
\arcsin t + \arccos t = \frac{1}{2}\pi,
\]

\[
\arctan t + \arccot t = \frac{1}{2}\pi,
\]

\[
\arccsc t + \arccsc t = \frac{1}{2}\pi.
\]

Therefore,
arccos \( t = \frac{1}{2} \pi - \arctan \frac{t}{\sqrt{1 - t^2}} \)

arccot \( t = \frac{1}{2} \pi - \arctan t \)

arccsc \( t = \begin{cases} \frac{1}{2} \pi - \arctan \sqrt{t^2 - 1} & \text{if } t \geq 1 \\ -\frac{1}{2} \pi - \arctan \sqrt{t^2 - 1} & \text{if } t \leq -1 \end{cases} \).

Some texts use an alternate definition of the inverse secant:

\[ \text{arcsec} \ t = \arccos(1/t). \]

With that definition,

\[ \text{arcsec} \ t = \frac{1}{2} \pi - \arctan \frac{1}{\sqrt{t^2 - 1}} \]

\[ \text{arccsc} \ t = \arctan \frac{1}{\sqrt{t^2 - 1}}. \]