Example

Find the exact value of the following expressions.

\[ \sin^{-1}(0) \]
\[ \cos^{-1}(0) \]

**SOLUTION:**

\( \sin^{-1}(0) \) is a number whose sine is 0. There are infinitely many such numbers, but the range of \( \sin^{-1} \) is \( \left[ -\frac{\pi}{2}, \frac{\pi}{2} \right] \). Since \( \sin(0) = 0 \) and since \( -\frac{\pi}{2} \leq 0 \leq \frac{\pi}{2} \), then \( \sin^{-1}(0) = 0 \).

Similarly, \( \cos^{-1}(0) \) is a number whose cosine is 0. The range of \( \cos^{-1} \) is \( [0, \pi] \). Since \( \cos \left( \frac{\pi}{2} \right) = 0 \) and since \( 0 \leq \frac{\pi}{2} \leq \pi \), then \( \cos^{-1}(0) = \frac{\pi}{2} \).