Principle Values of the Inverse Trigonometric Functions
Section 6-5

Are \( y = \sin^{-1} x \), \( y = \cos^{-1} x \), \( y = \tan^{-1} x \), \( y = \cot^{-1} x \), \( y = \sec^{-1} x \) and \( y = \csc^{-1} x \) functions? ______ Why or why not? ______
__________________________________________________________

Fortunately, there is a solution to this problem! We can restrict the domains in the original trigonometric functions.

Do you remember in which quadrants the sine is positive and negative?

Okay, we need to restrict the domain using a couple of rules.

1. We must include 0°.

2. We must use only two quadrants and those two quadrants must be adjacent.

3. We must have positive and negative values of the sine.

Which two quadrants does that leave us? ______________________

We call this new sine function with the restricted domain \( y = Sin x \) with the understanding that ________________________.
Principle Values of the Inverse Trigonometric Functions
Section 6-5
Okay, let’s repeat this process for the cosine. Remember our rules?

1. We must include 0°.

2. We must use only two quadrants and those two quadrants must be adjacent.

3. We must have positive and negative values of the cosine.

Which two quadrants does that leave us? ______________________

We call this new cosine function with the restricted domain
\[ y = \cos x \]
with the understanding that __________________________.

************************************************************

Let’s do this process again for the tangent.

Which two quadrants does that leave us? ______________________

We call this new tangent function with the restricted domain
\[ y = \tan x \]
with the understanding that __________________________.
Principle Values of the Inverse Trigonometric Functions
Section 6-5

Let’s add this new information to your graphs of the sine, cosine and tangent.

******************************************************************************

Now that we’ve restricted the domains on the sine, cosine and tangent, the arcsine, arccosine and arctangent graphs can become functions.

Let’s add this new information to your graphs of the arcsine, arccosine and arctangent.

******************************************************************************

Now that we know the subtle distinction between \( y = \sin x \), \( y = \sin^{-1} x \) and \( y = \sin^{-1} x \), we’re ready to solve some more problems! 😊

Ex. Find \( \text{Arc cos} \frac{1}{2} \).
Principle Values of the Inverse Trigonometric Functions
Section 6-5

Ex. Find \( y = \sin^{-1}\left( \tan \frac{\pi}{4} \right) \).

Ex. Find \( \sin \left( \sin^{-1}1 - \cos^{-1} \frac{1}{2} \right) \).