0.1 The arccosine function

0.1.1 Description

The arccosine function is the inverse trigonometric function.
The arccosine of x is defined as the inverse cosine function of x when -1≤x≤1. When the cosine of y is equal to x:
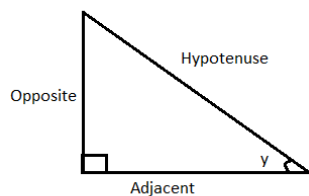
$$\cos y = x \tag{1}$$

Then the arccosine of x is equal to the inverse cosine function of x, which is equal to y:

$$\arccos x = \cos^- 1x = y \tag{2}$$

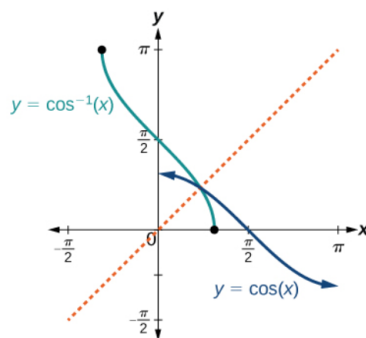(Here $\cos^- 1$ x means the inverse cosine and does not mean cosine to the power of -1).[2]
For example,

$$\cos y = \frac{Adjacent}{Hypotenuse} \rightarrow y = \arccos\left(\frac{Adjacent}{Hypotenuse}\right) \tag{3}$$

0.1.2 Domain & Co-Domain of arccosine

- The domain of $\arccos x$ is -1 $\leq$ x $\leq$ 1.
- The range of $\arccos x$ is $0 \leq$ y $\leq \pi$ in radians or $0° \leq$ y $\leq 180°$ in degrees.
- It is most useful when trying to find the angle measure when two sides of a triangle are known.

0.1.3 Properties of arccosine

- For the arccosine function to be a true inverse function of the sine function, the following statement must be true: $\cos(\arccos(x)) = x$ and $\arccos(\cos(x)) = x$
- The arccosine function is a reflection of the cosine function about the line $y = x$.
- The arccosine function is defined when -1 $\leq$ x ≤ 1
- The arccosine function is continuous on open interval (-1,1)

0.1.4 Application of arccosine

- Arccosine function are unique function and useful in finding remaining angles of right triangle.
- It is also useful in application of engineering, physics and others.

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0.2   Requirements for arccosine

There are some functional and non-function requirement for $F(x) = y = \arccos x$,

- When value for F(x) is defined,the System should print defined value of F(x)
- When value for x is entered outside domain range,the System should print undefined.
- When user enters data of any other types rather than numbers as an input,the System shall not accept that entered data as an input.
- The program should cover all possible test cases

Bibliography

[1] https://courses.lumenlearning.com/boundless-algebra/chapter/
    trigonometric-functions-and-the-unit-circle/

[2] https://www.rapidtables.com/math/trigonometry/arccos.html