0.1 The arccosine function

0.1.1 Description

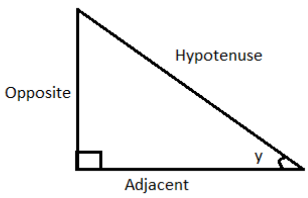
The arccosine function is the inverse trigonometric function.
The arccosine of x is defined as the inverse cosine function of x when -1≤x≤1. When the cosine of y is equal to x:

$$\cos y = x \tag{1}$$

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,

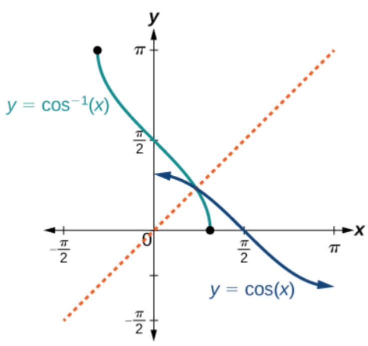


$$\cos y = \frac{Adjacent}{Hypotenuse} \to y = \arccos(\frac{Adjacent}{Hypotenuse}) \tag{3}$$

0.1.2 Domain & Co-Domain of arc-cosine

- The domain of $\arccos x$ is -1 ≤ x ≤ 1.
- The range of $\arccos x$ is 0 ≤ y ≤ π in radians or 0°≤ y ≤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 arc-cosine



- 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 ≤ x ≤1
- The arccosine function is continuous on open interval (-1,1)

0.1.4 Application of arc-cosine

- 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.

Bibliography

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

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