

ETERNITY: FUNCTIONS - arccos(x)

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Objectives

Objectives for today:

- Description of function $\arccos(x)$.
- Critical Decisions.
- Review Source Code.
- Function Testing.
- Take away from Project.

Description

Function : $\arccos(x)$

- The arccos function is the inverse of the cosine function. It returns the angle whose cosine is a given number. The angle returned by this function is measured in radians or in degrees. The inverse is also called as \arccos or \cos^{-1} .
- arccos function is useful when trying to determine the remaining two angles of a right triangle when the length of sides is known. It is calculated as below

$$\theta = \arccos\left(\frac{\text{adjacent}}{\text{hypotenuse}}\right)$$

- Derivative of arccos is given by,

$$\frac{d}{dx} \arccos(x) = \frac{-1}{\sqrt{1-x^2}}$$

Domain

$$-1 \leq x \leq 1$$

Co-Domain

$$0 \leq y \leq \pi$$

Characteristic

- Function is neither even nor odd
- Function is decreasing
- Ranges of the inverse function are subsets of the domain
- Function is defined for complex arguments
- Function is multi-valued, unless its principal value is defined

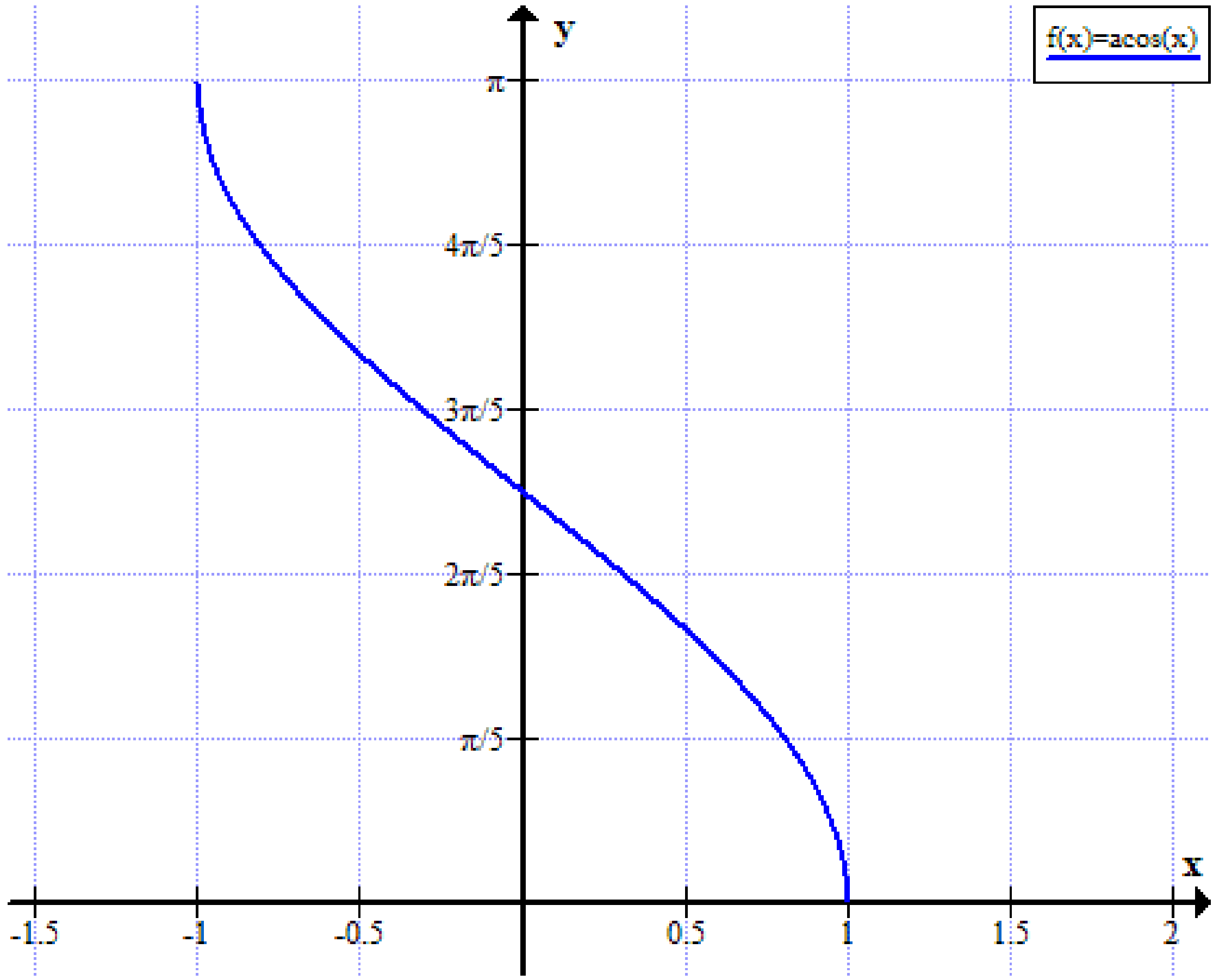


Figure 1: Graph of inverse cosine function

Critical Decision

Below are some critical decision made during the project.

- 1 During the analysis phase, determining the algorithm for function arccos was critical. As most of them have better performance. Later I had decided to consider the Big O Notation of the algorithm which can be a better solution to choose the algorithm.
- 2 During the requirement capture, it was difficult to decide the invalid input conditions as the function accepts only numeric values between -1 and 1.
- 3 There were few assumptions which was decided during the requirement analysis, which forms the primary requisite for the function.

Source Code Review

- 1 It helped me to identify few mistakes which a developer does while writing the program, from which i can rectify those during development.
- 2 Understood how manual and automated review tools work to identify issues in the program.
- 3 It helped me to realize the importance of comments in source code for anyone to understand and review the code.

Function Testing

- 1 It enhanced my knowledge by testing the function written by other developer.
- 2 understanding the test cases written right away was challenging, as prior knowledge about the function is required.
- 3 It improved my testing skills.

Take away from Project

- 1 I had some experience using the review tools like PMD, check-style, Codacy.
- 2 Got chance to learn how actually trigonometric function calculation works.
- 3 It was a good experience to review and test a source code written by other developer.
- 4 This project helped me to understand the each phase of software process being involved in all the phases.
- 5 It enhanced my knowledge on programming style like google java style.
- 6 I got opportunity to learn more about Testing framework Junit.

Arccos(x)

X	arccos(x) (rad)	arccos(x) (°)
-1	π	180°
$-\frac{\sqrt{3}}{2}$	$\frac{5\pi}{6}$	150°
$-\frac{\sqrt{2}}{2}$	$\frac{3\pi}{4}$	135°
$-\frac{1}{2}$	$\frac{2\pi}{3}$	120°
0	$\frac{\pi}{2}$	90°
$\frac{1}{2}$	$\frac{\pi}{3}$	60°
$\frac{\sqrt{2}}{2}$	$\frac{\pi}{4}$	45°
$\frac{\sqrt{3}}{2}$	$\frac{\pi}{6}$	30°
1	0	0°

Table 1: Arccos(x) table