6.3 Trigonometric Equations

Trigonometric equations: equations containing trigonometric functions.

Simplest type: one trig function = number

equation: Given \( \cos \theta = \frac{1}{2} \)

a) find any solution in the interval \([0, 2\pi]\)

b) find all solutions for this equation.

If necessary, isolate the trig function.

example: Find all solutions to the equation \( 2 \sin \theta + \sqrt{2} = 0 \)

example: Find all the solutions in the interval \(0 \leq \theta < 2\pi\) : \( \cos(3\theta) = \frac{\sqrt{3}}{2} \)

Given any trigonometric equation, try to rewrite the equation in the simplest type (above).

example: \( 2 \sin^2 x - 3 \sin x - 2 = 0 \) find all solutions in \( \mathbb{R} \).

example: \( \tan^2 x + \tan x = 20 \) find all solutions in \([0, 2\pi]\)

example: \( 3 \sin x + \tan x = 0 \) find all solutions in \([0, 2\pi]\)

example: Find all solutions in \([0, 2\pi]\) to \( 4 \cos^4 \theta + 5 \cos^2 \theta - 6 = 0 \)

example: Solve for all \( x \in [0, 2\pi] \) : \( \cos(3x) = 1 \)

example: Solve for \( x \in [0, 2\pi] \) : \( \sin(2x) = \frac{1}{2} \)

example: Solve : \( \sin x = 3 \cos x \)