

Calculus I Section 1-5: Solving Trig Equations with Calculators II

Question 1

Solve the equation

$$2 \cos(x) + 1 = 0$$

for all $x \in [0, 2\pi]$, and round your answers to two decimal places if necessary.

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Question 1 - Solution

Step 1: Isolate the cosine term

$$2 \cos(x) + 1 = 0 \Rightarrow \cos(x) = -\frac{1}{2}$$

Step 2: Solve the equation using inverse cosine

$$\cos^{-1}\left(\frac{1}{2}\right) = \frac{\pi}{3} \Rightarrow \text{Reference angle} = \frac{\pi}{3}$$

Since cosine is negative, the solutions are in Quadrants II and III:

- Quadrant II: $x = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$ - Quadrant III: $x = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$

$$x = \frac{2\pi}{3}, \frac{4\pi}{3}$$