Solving Trigonometric Equations

Precalculus Honors

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Solving on $[0, 2\pi)$

Problem: Solve $2\cos(x) + \sqrt{2} = 0$

Step 1: Isolate the function

$$2\cos(x) = -\sqrt{2}$$

$$\cos(x) = -\frac{\sqrt{2}}{2}$$

Step 2: Quadrant Check Since the ratio is negative, x must be in:

Quadrant II or Quadrant III

Finding the Values

Step 3: Reference Angle

$$\cos(\theta') = \frac{\sqrt{2}}{2} \implies \theta' = \frac{\pi}{4}$$

Step 4: Final Solutions

$$\underbrace{x = \pi - \frac{\pi}{4}}_{\text{QII}} = \frac{3\pi}{4}$$

$$\underbrace{x = \pi + \frac{\pi}{4}}_{\text{QIII}} = \frac{5\pi}{4}$$

Solution Set: $S = \left\{\frac{3\pi}{4}, \frac{5\pi}{4}\right\}$