

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

Question 6

Solve the equation

$$1 + 3 \cos(x) = 0.4$$

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

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Question 6 - Solution

Step 1: Isolate the trigonometric function. The equation becomes

$$\cos(1x) = -0.2, \quad u = 1x, \quad 0 \leq u \leq 2\pi.$$

Let $\alpha = \arccos(-0.2)$. All solutions are

$$u = \pm\alpha + 2k\pi, \quad k \in \mathbb{Z}.$$

Step 2: Restrict and convert. Keep precisely the values of u in $[0, 2\pi]$ and divide by 1. Evaluating the inverse function at full precision and rounding only the final values gives

$$x \approx 1.77, 4.51.$$

These are all 2 solutions in the stated interval, in radians. Substitution of the unrounded values verifies the original equation.