

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

Question 8

Solve the equation

$$2 \cos(2x) - 1 = 0.6$$

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

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Question 8 - Solution

Step 1: Isolate the trigonometric function. The equation becomes

$$\cos(2x) = 0.8, \quad u = 2x, \quad 0 \leq u \leq 4\pi.$$

Let $\alpha = \arccos(0.8)$. 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 $[0, 4\pi]$ and divide by 2. Evaluating the inverse function at full precision and rounding only the final values gives

$$x \approx 0.32, 2.82, 3.46, 5.96.$$

These are all 4 solutions in the stated interval, in radians. Substitution of the unrounded values verifies the original equation.