

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

Question 4

Solve the equation

$$\cos(3x) = 0.2$$

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

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Question 4 - Solution

Step 1: Isolate the trigonometric function. The equation becomes

$$\cos(3x) = 0.2, \quad u = 3x, \quad 0 \leq u \leq 6\pi.$$

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 $[0, 6\pi]$ and divide by 3. Evaluating the inverse function at full precision and rounding only the final values gives

$$x \approx 0.46, 1.64, 2.55, 3.73, 4.65, 5.83.$$

These are all 6 solutions in the stated interval, in radians. Substitution of the unrounded values verifies the original equation.