

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

Question 7

Solve the equation

$$4 \sin(2x) = 3$$

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

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Question 7 - Solution

Step 1: Isolate the trigonometric function. The equation becomes

$$\sin(2x) = 0.75, \quad u = 2x, \quad 0 \leq u \leq 4\pi.$$

Let $\alpha = \arcsin(0.75)$. All solutions are

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

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

$$x \approx 0.42, 1.15, 3.57, 4.29.$$

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