

Question 4

Solve the equation

$$\sin(x) = -0.77$$

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

Question 4 - Solution

Step 1: Isolate the trigonometric function. The equation becomes

$$\sin(1x) = -0.77, \quad u = 1x, \quad 0 \leq u \leq 2\pi.$$

Let $\alpha = \arcsin(-0.77)$. 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 $[0, 2\pi]$ and divide by 1. Evaluating the inverse function at full precision and rounding only the final values gives

$$x \approx 4.02, 5.40.$$

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