

Solving Trigonometric Equations

Methods for Solving Equations

Definition. Common methods for solving trigonometric equations include:

- Linear methods
- Quadratic methods
- Factoring
- u -substitution

Important: Do not divide both sides by a factor, as this could eliminate solutions.

Linear Methods

Example Without Domain Restrictions

Example. Solve $2 \sin \theta - 1 = 0$.

Example With Domain Restrictions

Example. Solve $\tan \theta = \sqrt{3}$ on $0 \leq \theta < 2\pi$.

Example With an Extraneous Solution

Example. Solve $\sin \theta = \sqrt{1 - \cos^2 \theta}$, checking for extraneous solutions.

Example With No Solution

Example. Solve $2 \cos \theta + 3 = 0$.

Quadratic Methods

Example. Solve $4 \sin^2(\theta) - 1 = 0$.

Example. Solve $2 \cos^2(\theta) - 3 \cos(\theta) + 1 = 0$.

Factoring Methods

Example. Solve $\sin(\theta)\cos(\theta) - \sin(\theta) = 0$.

Example. Solve $\cot^2(\theta) - \cot(\theta) = 0$.

***u*-Substitution Methods**

Example. Solve $\sin\left(\frac{\theta}{3}\right) = -1$.

Example. Solve $\sin(2\theta) = \frac{1}{2}$ on $0 \leq \theta < \pi$.