

Solving Trig Equations with Multiple Angles Notes

When solving trig equations where the angle is something other than x or θ , you MUST adjust the interval.

Ex: Solve for $0 \leq \theta < 2\pi$

1. $\cos 2\theta = -\frac{1}{2}$

① Interval
 $2(0 \leq \theta < 2\pi)$
 $0 \leq 2\theta < 4\pi$

$\frac{2\theta}{2} = \frac{\frac{2\pi}{3}, \frac{4\pi}{3}, \frac{8\pi}{3}, \frac{10\pi}{3}}{2}$ ② Add 2π OR $\frac{6\pi}{3}$

$\theta = \frac{2\pi}{6}, \frac{4\pi}{6}, \frac{8\pi}{6}, \frac{10\pi}{6}$

$\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$

2. $\sin 3\theta = 0$

$3(0 \leq \theta < 2\pi)$
 $0 \leq 3\theta < 6\pi$

$\frac{3\theta}{3} = \frac{0\pi, \pi, 2\pi, 3\pi, 4\pi, 5\pi}{3}$

$\theta = 0\pi, \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \frac{4\pi}{3}, \frac{5\pi}{3}$

3. $\cot 3x = \sqrt{3}$

$0 \leq 3\theta < 6\pi$

$\tan 3x = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

Add 2π OR $\frac{12\pi}{6}$

$\tan 3x = \frac{\sqrt{3}}{3}$

$3x = \frac{\pi}{6}, \frac{7\pi}{6}, \frac{13\pi}{6}, \frac{19\pi}{6}, \frac{25\pi}{6}, \frac{31\pi}{6}$

1
2
3

3

$x = \frac{\pi}{18}, \frac{7\pi}{18}, \frac{13\pi}{18}, \frac{19\pi}{18}, \frac{25\pi}{18}, \frac{31\pi}{18}$

4. $\cos \frac{\theta}{2} = \frac{\sqrt{2}}{2}$

$\frac{1}{2} (0 \leq \theta < 2\pi)$

~~$2 \cdot \frac{\theta}{2} = \frac{\pi}{2} \cdot 2$~~

$0 \leq \frac{\theta}{2} < \pi$

$\theta = \frac{\pi}{2}$