

Name Key

Precalculus Unit 8 – 8.1 Homework Solving Trigonometric Equations

Find all solutions on the interval $[0, 2\pi)$.

1. $\cos x = \frac{\sqrt{3}}{2}$

$$x = \frac{\pi}{6}, \frac{11\pi}{6}$$

2. $\tan x = -\sqrt{3}$

$$x = \frac{2\pi}{3}, \frac{5\pi}{3}$$

3. $\sin x = \frac{\sqrt{3}}{2}$

$$x = \frac{\pi}{3}, \frac{2\pi}{3}$$

4. $\sec \theta = -2$

$$x = \frac{2\pi}{3}, \frac{4\pi}{3}$$

Find all solutions.

5. $\sqrt{3} \sec \theta - 2 = 0$

$$\sec \theta = \frac{2}{\sqrt{3}}$$

$$\cos \theta = \frac{\sqrt{3}}{2}$$

$$\theta = \frac{\pi}{6}, \frac{11\pi}{6}$$

$$\theta = \frac{\pi}{6} + 2\pi n, n \in \mathbb{Z}$$

$$\theta = \frac{11\pi}{6} + 2\pi n, n \in \mathbb{Z}$$

6. $4 \cos^2 x - 1 = 0$

$$\cos^2 x = \frac{1}{4}$$

$$\cos x = \pm \frac{1}{2}$$

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

$$x = \frac{\pi}{3} + \pi n, n \in \mathbb{Z}$$

$$x = \frac{2\pi}{3} + \pi n, n \in \mathbb{Z}$$

7. $(3 \tan^2 x - 1)(\tan^2 x - 3) = 0$

$$\tan^2 x = \frac{1}{3}$$

$$\tan^2 x = 3$$

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

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

$$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \quad x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$

$$x = \frac{\pi}{6} + \pi n, n \in \mathbb{Z}$$

$$x = \frac{5\pi}{6} + \pi n, n \in \mathbb{Z}$$

$$x = \frac{\pi}{3} + \pi n, n \in \mathbb{Z}$$

$$x = \frac{2\pi}{3} + \pi n, n \in \mathbb{Z}$$

8. $3 \tan^3 x = \tan x$

$$3 \tan^3 x - \tan x = 0$$

$$\tan x (3 \tan^2 x - 1) = 0$$

$$\tan x = 0 \quad \tan^2 x = \frac{1}{3}$$

$$x = 0, \pi \quad x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$x = \pi n, n \in \mathbb{Z}$$

$$x = \frac{\pi}{6} + \pi n, n \in \mathbb{Z}$$

$$x = \frac{5\pi}{6} + \pi n, n \in \mathbb{Z}$$

$$9. 2 \sin^2 x = 2 + \cos x$$

$$2(1 - \cos^2 x) = 2 + \cos x$$

$$2 \cos^2 x + \cos x = 0$$

$$\cos x (2 \cos x + 1) = 0$$

$$\cos x = 0 \quad \cos x = -1/2$$

$$x = \frac{\pi}{2}, \frac{3\pi}{2} \quad x = \frac{2\pi}{3}, \frac{4\pi}{3}$$

$$x = \frac{\pi}{2} + \pi n, n \in \mathbb{Z}$$

$$x = \frac{2\pi}{3} + 2\pi n, n \in \mathbb{Z}$$

$$x = \frac{4\pi}{3} + 2\pi n, n \in \mathbb{Z}$$

$$10. 2 \cos^2 x + \cos x - 1 = 0$$

$$(2 \cos x - 1)(\cos x + 1)$$

$$\cos x = 1/2 \quad \cos x = -1$$

$$x = \pi/3, 5\pi/3 \quad x = \pi$$

$$x = \pi/3 + 2\pi/3 n, n \in \mathbb{Z}$$