

Directions: For problems 1 – 8, find all solutions on the interval $0 \leq x < 2\pi$.

1. $2 \sin x + \sqrt{3} = 0$

$$2 \sin x = -\sqrt{3}$$

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

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

2. $6 \cos x - 1 = 2$

$$6 \cos x = 3$$

$$\cos x = \frac{3}{6} = \frac{1}{2}$$

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

3. $4 \tan x + 7 = 3$

$$4 \tan x = -4$$

$$\tan x = -1$$

$$x = \frac{3\pi}{4}, \frac{7\pi}{4}$$

4. $\sqrt{3} \tan x + 5 = 6$

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

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

$$x = \frac{\pi}{6}, \frac{7\pi}{6}$$

5. $8 \cos^2 x + 3 = 5$

$$8 \cos^2 x = 2$$

$$\cos^2 x = \frac{2}{8} = \frac{1}{4}$$

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

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

6. $2 \tan^2 x - 5 = 1$

$$2 \tan^2 x = 6$$

$$\tan^2 x = \frac{6}{2} = 3$$

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

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

7. $6 \sin^2 x + 9 = 12$

$$6 \sin^2 x = 3$$

$$\sin^2 x = \frac{3}{6} = \frac{1}{2}$$

$$\sin x = \pm \frac{1}{\sqrt{2}}$$

$$x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$$

8. $4 \sin^2 x + 2 = 5$

$$4 \sin^2 x = 3$$

$$\sin^2 x = \frac{3}{4}$$

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

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

9. Let $f(x) = 2 \cos x$ and $g(x) = -\sqrt{2}$. In the xy -plane, what are the x -coordinates of the points of intersection of the graph of f and g for $0 \leq x < 2\pi$?

$$2 \cos x = -\sqrt{2} \quad \cos x = -\frac{\sqrt{2}}{2} \quad x = \frac{3\pi}{4}, \frac{5\pi}{4}$$

10. Let $f(x) = \sin x$ and $g(x) = 2 \sin^2 x$. In the xy -plane, what are the x -coordinates of the points of intersection of the graph of f and g for $0 \leq x < 2\pi$?

$$\sin x = 2 \sin^2 x$$

$$\sin x = 0$$

$$x = 0, \pi$$

$$2 \sin^2 x - \sin x = 0$$

$$2 \sin x - 1 = 0$$

$$\sin x = \frac{1}{2}$$

$$x = \frac{\pi}{6}, \frac{5\pi}{6}$$

$$(\sin x)(2 \sin x - 1) = 0$$

11. Let $f(x) = 4\cos^2 x + 5$ and $g(x) = 8$. In the xy -plane, what are the x -coordinates of the points of intersection of the graph of f and g for $0 \leq x < 2\pi$?

$$4\cos^2 x + 5 = 8 \quad 4\cos^2 x = 3 \quad \cos^2 x = \frac{3}{4} \quad \cos x = \pm \frac{\sqrt{3}}{2} \quad x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

12. The function g is given by $g(x) = \sqrt{3}\cos x + 2\cos x \sin x$. What are the zeros of g on the interval $0 \leq x < 2\pi$?

$$\begin{aligned} \sqrt{3}\cos x + 2\cos x \sin x &= 0 & (\cos x)(\sqrt{3} + 2\sin x) &= 0 \\ \cos x &= 0 & \sqrt{3} + 2\sin x &= 0 \\ x &= \frac{\pi}{2}, \frac{3\pi}{2} & \sin x &= -\frac{\sqrt{3}}{2} \\ & & x &= \frac{4\pi}{3}, \frac{5\pi}{3} \end{aligned}$$

13. The function h is given by $h(x) = 3\tan^2 x - 1$. What are the zeros of h on the interval $0 \leq x < 2\pi$?

$$3\tan^2 x - 1 = 0 \quad 3\tan^2 x = 1 \quad \tan^2 x = \frac{1}{3} \quad \tan x = \pm \frac{1}{\sqrt{3}} \quad x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

14. What are all values of θ , for $0 \leq \theta < 2\pi$, where $4\sin^2 \theta = 1$?

$$4\sin^2 x = 1 \quad \sin^2 x = \frac{1}{4} \quad \sin x = \pm \frac{1}{2} \quad x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$