V/5 Solving Basic Trig Equations with Factoring – Review Name Key

Solve the following equations over $[0, 2\pi)$.

1. $\cot x + 1 = 0$

$\cot x = -1$

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

2. $2\cos x + 1 = 0$

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

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

3. $\sin x + 2 = 0$

$\sin x = -2$

$\varnothing$

4. $2\sin x - 1 = 0$

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

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

5. $\sin x + \sqrt{2} = -\sin x$

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

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

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

6. $\csc^2 x + 2 = 4$

$\csc^2 x = 2$

$\csc x = \pm\sqrt{2}$

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

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

7. $\tan x + \sqrt{3} = 0$

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

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

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

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

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

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

9. $7 + \cos x = 4 - 5\cos x$

$6\cos x = -3$

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

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

10. $-5 + 2\cos x = -2 + \cos x$

$\cos x = 3$

$\varnothing$

11. $4 + 7\cot x = -2\sqrt{3} + \cot x + 4$

$6\cot x = -2\sqrt{3}$

$\cot x = -\frac{\sqrt{3}}{3}$

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

12. $-6 + 3\tan x = \sqrt{3} - 6$

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

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

13. $\tan^2 x - 3 = 0$

$\tan^2 x = 3$

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

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

14. $3\tan^2 x - 1 = 0$

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

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

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

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

15. $\tan x(\tan x - 1) = 0$

$\tan x = 0 \quad \tan x = 1$

$x = 0\pi, \pi, \frac{\pi}{4}, \frac{5\pi}{4}$

16. $2\cos^2 x - \sqrt{3}\cos x = 0$

$\cos^2 x(2\cos x - \sqrt{3}) = 0$

$\cos^2 x = 0 \quad \cos x = \frac{\sqrt{3}}{2}$

$\cos x = 0$

$x = \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{11\pi}{6}$

17. $\sin^2 x - \sin x = 2$

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

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

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

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

18. $1 + \csc^2 x + \csc x = 3$

$\csc^2 x + \csc x - 2 = 0$

$(\csc x + 2)(\csc x - 1) = 0$

$\csc x = -2 \quad \csc x = 1$

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

$x = \frac{5\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$

19. ~~1~~ $+ \tan^2 x + \tan x =$ ~~1~~

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

$\tan x(\tan x + 1) = 0$

$\tan x = 0 \quad \tan x = -1$

$x = 0\pi, \pi, \frac{3\pi}{4}, \frac{7\pi}{4}$

20. $1 - \cos^2 x + \cos x = -1$

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

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

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

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

$x = \pi$

21. $2\sin^2 x - \sin x = 1$

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

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

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

$x = \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{2}$

22. ~~2~~ $- 2\cos^2 x =$ ~~2~~ $+ \cos x$

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

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

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

$\cos x = 0 \quad \cos x = -\frac{1}{2}$

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

23. $\sec^2 x - \sec x = 2$

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

$(\sec x - 2)(\sec x + 1) = 0$

$\sec x = 2 \quad \sec x = -1$

$\cos x = \frac{1}{2} \quad \cos x = -1$

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

24. $3\tan^3 x = \tan x$

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

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

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

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

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