

Solving Trig Equations WS 1

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

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

Q III, Q IV

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

2) $\sqrt{3} \sec x = 2$

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

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

Q I, Q IV

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

3) $\tan x - \sqrt{3} = 0$

$\tan x = \sqrt{3}$

Q I, Q III

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

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

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

$\sec^2 x = 2$

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

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

Q I, Q II, Q III, Q IV

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

5) $2\cos x - 1 = 0$

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

Q I, Q IV

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

6) $2\sin^2 x = 1$

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

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

Q I, Q II, Q III, Q IV

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

7) $\tan x (\tan x - 1) = 0$

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

$\sin x = 0$

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

8) $\csc^2 x - 2 = 0$

$\csc^2 x = 2$

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

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

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

9) $\sin x (\sin x + 1) = 0$

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

$x = 0, \pi$ $x = \frac{3\pi}{2}$

10) $\sqrt{3} \tan x + 1 = 0$

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

Q II, Q IV

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

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

11) $\sec x + 2 = 0$

$\sec x = -2$

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

Q II, Q III

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

12) $\cos x + 1 = 0$

$\cos x = -1$

$x = \pi$

$$13) \sec x \csc x - 2 \csc x = 0$$

$$\csc x (\sec x - 2) = 0$$

$$\csc x = 0 \quad \sec x = 2$$

$$\sin x = \text{undef} \quad \cos x = \frac{1}{2}$$

∅

QI, QIV

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

$$14) 2 \sin^2 x + 3 \sin x + 1 = 0$$

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

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

QIII, QIV

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

$$15) 2 \cos x \sin x + \cos x = 0$$

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

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

QIII, QIV

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

$$16) 2 \sin^2 x - \sin x - 1 = 0$$

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

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

QIII, QIV

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

$$17) 2 \cot^2 x \sin x = \cot^2 x$$

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

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

$$\cot^2 x = 0 \quad \sin x = \frac{1}{2}$$

$\cot x = 0 \rightarrow$

$$\cot x = 0 \quad \text{QI, QII}$$

$$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2} \quad x = \frac{\pi}{6}, \frac{5\pi}{6}}$$

$$18) \tan^2 x - 2 \tan x + 1 = 0$$

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

$$\tan x = 1$$

QI, QIII

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

$$19) \sin x \cdot \tan x + \tan x = 0$$

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

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

$$\frac{\sin x}{\cos x} = 0$$

$$\cos x$$

$$\sin x = 0$$

$$\boxed{x = 0, \pi}$$

$$20) \sin x = \tan x$$

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

$$\cos x$$

$$\cos x \sin x = \sin x$$

$$\cos x \sin x - \sin x = 0$$

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

$$\sin x = 0 \quad \cos x = 1$$

$$\boxed{x = 0, \pi} \quad x = 0$$

$$21) (\cos^2 x - 1)(\cot x + 1) = 0$$

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

$$\cos x = \pm 1$$

$$\cancel{x = 0, \pi}$$

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

$$22) \cos x (\sec x - 2) = 0$$

$$\cos x = 0 \quad \sec x = 2$$

$$\cancel{x = \frac{\pi}{2}, \frac{3\pi}{2}} \quad \cos x = \frac{1}{2}$$

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

$$23) \sin^2 x \tan x - \tan x = 0$$

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

$$\tan x = 0 \quad \sin^2 x = 1$$

$$\boxed{x = 0, \pi}$$

$$\sin x = \pm 1$$

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

$$\tan \frac{\pi}{2} = \frac{1}{0} \text{ invalid}$$

$$\tan \frac{3\pi}{2} = \frac{-1}{0} \text{ invalid}$$

$$24) \cos x = \cot x$$

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

$$\sin x \cos x = \cos x$$

$$\sin x \cos x - \cos x = 0$$

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

$$\cos x = 0 \quad \sin x = 1$$

$$\boxed{x = \frac{\pi}{2}, \frac{3\pi}{2}} \quad \cancel{x = 0}$$

