

# Supplemental WS #4

D

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

$2 \sin x = 1$

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

← +  $\frac{30}{30}$  Q I or Q II

Q I:  $x = \frac{\pi}{6} + 2\pi k$

Q II:  $x = \frac{5\pi}{6} + 2\pi k$

$k \in \mathbb{Z}$

b)  $\tan x = 0$

← occurs on axes  
when  $\sin x = 0$

$x = 0, \pi, 2\pi, \dots$

$x = \boxed{k\pi} \quad k \in \mathbb{Z}$

c)  $4 \sin^2 x - 1 = 0$

$4 \sin^2 x = 1$

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

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

← all 4 quadrants

Q I:  $x = \frac{\pi}{6} + 2\pi k$

Q II:  $x = \frac{5\pi}{6} + 2\pi k$

Q III:  $x = \frac{7\pi}{6} + 2\pi k$

Q IV:  $x = \frac{11\pi}{6} + 2\pi k$

$k \in \mathbb{Z}$

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

$$1 + \sin x = 0 \quad \text{or} \quad 1 - \cos x = 0$$

$$\sin x = -1$$

$$x = \boxed{\frac{3\pi}{2} + 2\pi k}$$

$$1 - \cos x = 0$$

$$\cos x = 1$$

$$x = 0 + 2\pi k$$

$$x = \boxed{2\pi k}$$

$$e) 2 \sec x + 4 = 0$$

$$2 \sec x = -4$$

$$\sec x = -\frac{4}{2}$$

$$\cos x = -\frac{2}{4}$$

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

← Q II or Q III

$$Q II \quad x = \boxed{\frac{2\pi}{3} + 2\pi k}$$

$$Q III \quad x = \boxed{\frac{4\pi}{3} + 2\pi k}$$

$$k \in \mathbb{Z}$$

$$f) 4 \csc x + 6 = 14$$

$$4 \csc x = 8$$

$$\csc x = 2$$

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

← Q I or Q II

$$Q I \quad x = \boxed{\frac{\pi}{6} + 2\pi k}$$

$$Q II \quad x = \boxed{\frac{5\pi}{6} + 2\pi k}$$

$$k \in \mathbb{Z}$$

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

$$\sin x - 1 = 0$$

or

$$2 \sec x + 1 = 0$$

$$\sin x = 1$$

$$2 \sec x = -1$$

$$x = \boxed{\frac{\pi}{2} + 2\pi k}$$

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

$$k \in \mathbb{Z}$$

$$\cos x = -2$$

no solution

$$② \quad a) \quad 4 \sin^2 x - 3 = 0$$

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

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

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

← all 4 quadrants

$$Q I \quad x =$$

$$\frac{\pi}{3}$$

or

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

$$Q II \quad x =$$

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

or

$$\frac{5\pi}{3}$$

$$Q III \quad x =$$

$$\frac{4\pi}{3}$$

or

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

$$Q IV \quad x =$$

$$\frac{5\pi}{3}$$

or

$$\frac{\pi}{3}$$

$$2) \quad b) \quad 5 \tan x + \sqrt{5} = 0$$

$$5 \tan x = -\sqrt{5}$$

$$\tan x = -\frac{1}{\sqrt{5}}$$

← Q II or Q IV

$$Q II: \quad x = \boxed{\frac{5\pi}{4} \quad \text{or} \quad -\frac{3\pi}{4}}$$

$$Q IV: \quad x = \boxed{\frac{7\pi}{4} \quad \text{or} \quad -\frac{\pi}{4}}$$

3)

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

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

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

or

$$\sin x + 1 = 0$$

$$2 \sin x = 1$$

$$\sin x = -1$$

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

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

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