

(I)

① $\cos(x) = \frac{1}{2}$

Quad Check Q I Q III

$$\left\{ \frac{\pi}{3}, \frac{5\pi}{3} \right\}$$

$x_R = \frac{\pi}{3} \Rightarrow x = \frac{\pi}{3} \quad x = \frac{5\pi}{3}$

② $\cos(x) = \frac{\sqrt{2}}{2}$

Quad check Q I Q III

$$\left\{ \frac{\pi}{4}, \frac{7\pi}{4} \right\}$$

$x_R = \frac{\pi}{4} \Rightarrow x = \frac{\pi}{4} \quad x = \frac{7\pi}{4}$

③ $\sin(x) = -\frac{1}{2}$

Quad check Q III Q IV

$$\left\{ \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$$

$x_R = \frac{7\pi}{6} \Rightarrow x = \frac{7\pi}{6} \quad x = \frac{11\pi}{6}$

④ $\sin(x) = -\frac{\sqrt{3}}{2}$

Quad: Check Q III Q IV

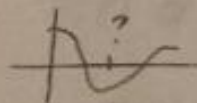
$$\left\{ \frac{4\pi}{3}, \frac{5\pi}{3} \right\}$$

$x_R = \frac{4\pi}{3} \Rightarrow x = \frac{4\pi}{3} \quad x = \frac{5\pi}{3}$

⑤ $\cos(x) = -1$

Quadrantal

$$\left\{ \pi \right\}$$



$x = \pi$

⑥ $\cos(x) = 0$

Quadrantal

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

$$\Rightarrow \left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$$

⑦. $\sin(\theta) = 0$

Quadrantal



$\Rightarrow X = 0 \quad X = \pi$ (RADIANs)

$\Rightarrow \theta = 0^\circ \quad \theta = 180^\circ$ (DEGREES)

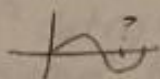
$\Rightarrow \boxed{\{0^\circ, 180^\circ\}}$

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NOTE: FOR
DEGREES
THE SYMBOL
IS REQUIRED

⑧. $\sin(\theta) = -1$

Quadrantal



$X = \frac{3\pi}{2} \Rightarrow \theta = 270^\circ$

$\Rightarrow \boxed{\{270^\circ\}}$

⑨. $\cos(\theta) = -\frac{1}{2}$

Quadrant Check QII QIII

$X_R = \frac{\pi}{3} \Rightarrow \theta_R = 60^\circ$

$\Rightarrow \theta = 120^\circ \quad \theta = 240^\circ$

$\Rightarrow \boxed{\{120^\circ, 240^\circ\}}$

⑩. $\cos(\theta) = -\frac{\sqrt{2}}{2}$

Quadrant Check QII QIII

$X_R = \frac{\pi}{4} \Rightarrow \theta_R = 45^\circ$

$\Rightarrow \theta = 135^\circ \quad \theta = 225^\circ$

$\Rightarrow \boxed{\{135^\circ, 225^\circ\}}$

⑪. $\sin(\theta) = -\frac{\sqrt{2}}{2}$

Quadrant Check QIII QIV

$X_R = \frac{\pi}{4} \Rightarrow \theta_R = 45^\circ \Rightarrow \theta = 225^\circ \quad \theta = 315^\circ$

$\Rightarrow \boxed{\{225^\circ, 315^\circ\}}$

12. $\sin(\theta) = -\frac{\sqrt{3}}{2}$

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Quadrant check QIII QIV

$\Rightarrow \{240^\circ, 300^\circ\}$

$x_R = \frac{\pi}{3} \Rightarrow \theta_R 60^\circ \Rightarrow \theta = 240^\circ \theta = 300^\circ$

15. $2\cot(x) + 1 = -1$

Solve for $\cot(x)$

$\Rightarrow 2\cot(x) = -2$

$\Rightarrow \cot(x) = -1$

Reciprocal to create

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

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

Quadrant check

QII QIII

$x_R = \frac{\pi}{4}$

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

$\Rightarrow \left\{ \frac{3\pi}{4}, \frac{7\pi}{4} \right\}$

16. $\sin(x) + 2 = 3$

Solve for $\sin(x)$

$\Rightarrow \sin(x) = 1$

Quadrantal

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

$\Rightarrow \left\{ \frac{\pi}{2} \right\}$

17. $2\sin(x) + 3 = 4$

Solve for $\sin(x)$

$\Rightarrow 2\sin(x) = 1$

$\Rightarrow \sin(x) = \frac{1}{2}$

Quadrant check QI, QII

$x_R = \frac{\pi}{6} \Rightarrow x = \frac{\pi}{6} x = \frac{5\pi}{6}$

$\Rightarrow \left\{ \frac{\pi}{6}, \frac{5\pi}{6} \right\}$

18) $2\sec(x) + 1 = \sec(x) + 3$

Solve $-\sec(x)$ $-\sec(x)$

$\sec(x) \Rightarrow \sec(x) + 1 = 3$

$\Rightarrow \sec(x) = 2$

Reciprocal to create $\cos(x)$

$\Rightarrow \cos(x) = \frac{1}{2}$

Quadrant Check

QI QIII

$x_R = \pi/3 \Rightarrow$

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

$\Rightarrow \left\{ \frac{\pi}{3}, \frac{5\pi}{3} \right\}$

19) $\tan^2(x) + 3 = 0$

$\Rightarrow \tan^2(x) = -3$

$\Rightarrow \tan(x) = \pm\sqrt{-3} \Rightarrow \emptyset$

$\hookrightarrow$ NO
SOLN

20) $\sec^2(x) + 2 = -1$

$\Rightarrow \sec^2(x) = -3 \Rightarrow \emptyset$

$\Rightarrow \sec(x) = \pm\sqrt{-3} \Rightarrow$ NO
SOLN

21) $(\cot(x) - 1)(\sqrt{3}\cot(x) + 1) = 0$

$\Rightarrow \cot(x) - 1 = 0$ or $\sqrt{3}\cot(x) + 1 = 0$

$\Rightarrow \cot(x) = 1$ $\Rightarrow \cot(x) = -\frac{1}{\sqrt{3}}$

RECIPROCAL

Reciprocals

$\Rightarrow \tan(x) = -\sqrt{3}$

$\tan(x) = 1$

Quad check QI QIII

Quad. chk. QII QIII

$x_R = \pi/4$

$x_R = \pi/3$

$\Rightarrow \left\{ \frac{\pi}{4}, \frac{5\pi}{4}, \frac{2\pi}{3}, \frac{5\pi}{3} \right\}$

$\Rightarrow x = \pi/4 \quad x = 5\pi/4$

$\Rightarrow x = 2\pi/3 \quad x = 5\pi/3$

22. $(\csc(x) + 2)(\csc(x) - \sqrt{2}) = 0$

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$\Rightarrow \csc(x) + 2 = 0$ or $\csc(x) - \sqrt{2} = 0$

$\Rightarrow \csc(x) = -2$

Reciprocals

$\Rightarrow \sin(x) = -\frac{1}{2}$

Quadrant check QIII QIV

$x_1 = \frac{\pi}{6} \Rightarrow x = \frac{7\pi}{6} \quad x = \frac{11\pi}{6}$

$\Rightarrow \csc(x) = \sqrt{2}$

Reciprocals

$\Rightarrow \sin(x) = \frac{1}{\sqrt{2}}$

Quad. chk: QI QII

$x_1 = \frac{\pi}{4} \quad x = \frac{\pi}{4} \quad x = \frac{3\pi}{4}$

$\left\{ \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{\pi}{4}, \frac{3\pi}{4} \right\}$

23. $\cos^2(x) + 2\cos(x) + 1 = 0$

FACTOR

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

$\Rightarrow \cos(x) + 1 = 0$ or $\cos(x) + 1 = 0$

$\Rightarrow \cos(x) = -1$

Quadrantal

~~$x = \pi$~~

$x = \pi$

SAME
SOLUTION

$\Rightarrow \left\{ \pi \right\}$

24. $2\cos^2(x) - \sqrt{3}\cos(x) = 0$

FACTOR

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

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

Quadrantal

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

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

$\Rightarrow 2\cos(x) = \sqrt{3}$

$\Rightarrow \cos(x) = \frac{\sqrt{3}}{2}$

Quad. chk: QI QIV

$x_1 = \frac{\pi}{6}$

$\Rightarrow x = \frac{\pi}{6} \quad x = \frac{11\pi}{6}$

$\Rightarrow \left\{ \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{6}, \frac{11\pi}{6} \right\}$

#25. $-2\sin^2(x) = 3\sin(x) + 1$

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

Factor

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

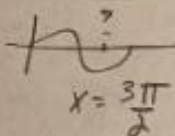
$\Rightarrow 2\sin(x) + 1 = 0$ or $\sin(x) + 1 = 0$

$\Rightarrow \sin(x) = -1/2$

$\Rightarrow \sin(x) = -1$
Quadrantal

Quadrant Check
Q III Q IV

$x_1 = \frac{7\pi}{6} \Rightarrow x = \frac{7\pi}{6} \quad x = \frac{11\pi}{6}$



$\Rightarrow \left\{ \frac{7\pi}{6}, \frac{11\pi}{6}, \frac{3\pi}{2} \right\}$

#26. $2\cos^2(x) - \cos(x) = 1$

$\Rightarrow 2\cos^2(x) - \cos(x) - 1 = 0$

NOW FACTOR

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

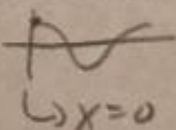
$\Rightarrow 2\cos(x) + 1 = 0$ or $\cos(x) - 1 = 0$

$\Rightarrow \cos(x) = -1/2$

$\Rightarrow \cos(x) = 1$
Quadrantal

Quad. chk = Q II Q III

$x_1 = \frac{\pi}{3} \Rightarrow x = \frac{2\pi}{3} \quad x = \frac{4\pi}{3}$



NOTE: Do NOT factor first since it is not yet equal to ZERO. AFTER the equation is set equal to ZERO THEN factor.

$\Rightarrow \left\{ \frac{2\pi}{3}, \frac{4\pi}{3}, 0 \right\}$