

1.

$$2 \sin x - \sqrt{3} = 0$$

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

$$x = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$$

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


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2.

$$\sqrt{3} \tan x - 1 = 0$$

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

$$x = \tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$$

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


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3.

$$\sqrt{2} \cos x - 1 = 0$$

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

$$x = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$$

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


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4.

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

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

$$x = \tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$$

$$x = -\frac{\pi}{6}$$


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5.

$$2 \sin x + \sqrt{2} = 0$$

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

$$x = \sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$$

$$x = -\frac{\pi}{4}$$


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6.

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

$$2 \cos x = 1$$

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

$$x = \cos^{-1}\left(\frac{1}{2}\right)$$

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


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7.

$$4 \sin^2 x = 1$$

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

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

$\sin x = \frac{1}{2}$ $x = \sin^{-1}\left(\frac{1}{2}\right)$ $x = \frac{\pi}{6}$	$\sin x = -\frac{1}{2}$ $x = \sin^{-1}\left(-\frac{1}{2}\right)$ $x = -\frac{\pi}{6}$
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8.

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

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

$\sin x = 0$ $x = \sin^{-1}(0)$ $x = 0$	$\cos x - 1 = 0$ $\cos x = 1$ $x = \cos^{-1}(1)$ $x = 0$
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9.

$$3 \sin^2 x - \cos^2 x = 0$$

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

$$3 \sin^2 x - 1 + \sin^2 x = 0$$

$$4 \sin^2 x = 1$$

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

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

$\sin x = \frac{1}{2}$ $x = \sin^{-1}\left(\frac{1}{2}\right)$ $x = \frac{\pi}{6}$	$\sin x = -\frac{1}{2}$ $x = \sin^{-1}\left(-\frac{1}{2}\right)$ $x = -\frac{\pi}{6}$
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10.

$$2 \cos^2 x + 3 \cos x + 1 = 0$$

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

$2 \cos x + 1 = 0$ $\cos x = -\frac{1}{2}$ $x = \cos^{-1}\left(-\frac{1}{2}\right)$ $x = \frac{2\pi}{3}$	$\cos x + 1 = 0$ $\cos x = -1$ $x = \cos^{-1}(-1)$ $x = \pi$
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11.

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

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

$$\sin x \left( \sin x - 2 \frac{1}{\sin x} - 1 \right) = (0) \sin x$$

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

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

$\sin x + 1 = 0$ $\sin x = -1$ $x = \sin^{-1}(-1)$ $x = -\frac{\pi}{2}$	$\sin x - 2 = 0$ $\sin x = 2$ $x = \sin^{-1}(2)$ $\text{Impossible}$
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12.

$$\sqrt{2} \sin x + 2 \sin^2 x = 0$$

$$\sin x (2 \sin x + \sqrt{2}) = 0$$

$\sin x = 0$ $x = \sin^{-1}(0)$ $x = 0$	$2 \sin x + \sqrt{2} = 0$ $\sin x = -\frac{\sqrt{2}}{2}$ $x = \sin^{-1}\left(-\frac{\sqrt{2}}{2}\right)$ $x = -\frac{\pi}{4}$
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13.

$$\cos 2x + \sin x = 1$$

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

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

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

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

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

$\sin x = 0$ $x = \sin^{-1}(0)$ $x = 0$	$2 \sin x - 1 = 0$ $\sin x = \frac{1}{2}$ $x = \sin^{-1}\left(\frac{1}{2}\right)$ $x = \frac{\pi}{6}$
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14.

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

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

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

$\cos x = 0$ $x = \cos^{-1}(0)$ $x = \frac{\pi}{2}$	$2 \sin x + 1 = 0$ $\sin x = -\frac{1}{2}$ $x = \sin^{-1}\left(-\frac{1}{2}\right)$ $x = -\frac{\pi}{6}$
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15.

$$4 \tan x + \sin 2x = 0$$

$$4 \frac{\sin x}{\cos x} + 2 \sin x \cos x = 0$$

$$2 \sin x \left( 2 \frac{1}{\cos x} + \cos x \right) = 0$$

$$2 \sin x = 0$$

$$x = \sin^{-1}(0)$$

$$x = 0$$

$$2 \frac{1}{\cos x} + \cos x = 0$$

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

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

Impossible

16.

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

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

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

$$2 \sin x = 0$$

$$x = \sin^{-1}(0)$$

$$x = 0$$

$$\cos x - 1 = 0$$

$$\cos x = 1$$

$$x = \cos^{-1}(1)$$

$$x = 0$$

1.

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

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

$$x = \sin^{-1}\left(-\frac{1}{2}\right)$$

$$x = -\frac{\pi}{6}$$

$$x = -\frac{\pi}{6} + 2\pi k \text{ and } x = \frac{7\pi}{6} + 2\pi k$$


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2.

$$4 \cos^2 x - 1 = 0$$

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

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

$\cos x = \frac{1}{2}$ $x = \cos^{-1}\left(\frac{1}{2}\right)$ $x = \frac{\pi}{3} + 2\pi k \text{ and } x = \frac{5\pi}{3} + 2\pi k$	$\cos x = -\frac{1}{2}$ $x = \cos^{-1}\left(-\frac{1}{2}\right)$ $x = \frac{2\pi}{3} + 2\pi k \text{ and } x = \frac{4\pi}{3} + 2\pi k$
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3.

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

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

$$x = \tan^{-1}(-\sqrt{3})$$

$$x = -\frac{\pi}{3} + \pi k$$


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4.

$$4 \sin^2 x - 4 \sin x + 1 = 0$$

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

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

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

$$x = \sin^{-1}\left(\frac{1}{2}\right)$$

$$x = \frac{\pi}{6} + 2\pi k \text{ and } x = \frac{5\pi}{6} + 2\pi k$$


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5.

$$2 \cos^2 x + 3 \cos x - 2 = 0$$

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

$2 \cos x - 1 = 0$ $\cos x = \frac{1}{2}$ $x = \cos^{-1}\left(\frac{1}{2}\right)$ $x = \frac{\pi}{3} + 2\pi k \text{ and } x = \frac{5\pi}{3} + 2\pi k$	$\cos x + 2 = 0$ $\cos x = -2$ $x = \cos^{-1}(-2)$ <p style="text-align: center;">Impossible</p>
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6.

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

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

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

$2 \cos x + 1 = 0$ $\cos x = -\frac{1}{2}$ $x = \cos^{-1}\left(-\frac{1}{2}\right)$ $x = \frac{2\pi}{3} + 2\pi k \text{ and } x = \frac{4\pi}{3} + 2\pi k$	$\cos x - 1 = 0$ $\cos x = 1$ $x = \cos^{-1}(1)$ $x = 0 + 2\pi k$
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7.

$$\cos^2 x + \cos 2x = \frac{5}{4}$$

$$\cos^2 x + \cos^2 x - \sin^2 x = \frac{5}{4}$$

$$2 \cos^2 x - (1 - \cos^2 x) = \frac{5}{4}$$

$$3 \cos^2 x - 1 = \frac{5}{4}$$

$$3 \cos^2 x = \frac{9}{4}$$

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

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

$\cos x = \frac{\sqrt{3}}{2}$ $x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$ $x = \frac{\pi}{6} + 2\pi k \text{ and } x = -\frac{\pi}{6} + 2\pi k$	$\cos x = -\frac{\sqrt{3}}{2}$ $x = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ $x = \frac{5\pi}{6} + 2\pi k \text{ and } x = \frac{7\pi}{6} + 2\pi k$
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8.

$$\cos^2 x - \cos 2x = \frac{3}{4}$$

$$\cos^2 x - (\cos^2 x - \sin^2 x) = \frac{3}{4}$$

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

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

$\sin x = \frac{\sqrt{3}}{2}$ $x = \sin^{-1}\left(\frac{\sqrt{3}}{2}\right)$ $x = \frac{\pi}{3} + 2\pi k \text{ and } x = \frac{2\pi}{3} + 2\pi k$	$\sin x = -\frac{\sqrt{3}}{2}$ $x = \sin^{-1}\left(-\frac{\sqrt{3}}{2}\right)$ $x = \frac{4\pi}{3} + 2\pi k \text{ and } x = \frac{5\pi}{3} + 2\pi k$
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9.

$$|\cos x| = 1$$

$\cos x = 1$ $x = \cos^{-1}(1)$ $x = 0$	$\cos x = -1$ $x = \cos^{-1}(-1)$ $x = \pi$
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10.

$$|\sin x| = 0.5$$

$\sin x = 0.5$ $x = \sin^{-1}(0.5)$ $x = \frac{\pi}{6} \text{ and } \frac{5\pi}{6}$	$\sin x = -0.5$ $x = \sin^{-1}(-0.5)$ $x = \frac{7\pi}{6} \text{ and } \frac{11\pi}{6}$
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11.

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

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

$\cos x = 0$ $x = \cos^{-1}(0)$ $x = \frac{\pi}{2} \text{ and } \frac{3\pi}{2}$	$\sin^2 x - 1 = 0$ $\sin^2 x = 1$ $\sin x = \pm 1$ $x = \sin^{-1}(\pm 1)$ $x = \frac{\pi}{2} \text{ and } \frac{3\pi}{2}$
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12.

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

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

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

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

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

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

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

$$\cos x - 1 = 0$$

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

$$\cos x = 1$$

$$x = \cos^{-1}\left(\frac{1}{2}\right)$$

$$x = \cos^{-1}(1)$$

$$x = \pi$$

$$x = \frac{\pi}{6} \text{ and } x = \frac{5\pi}{6}$$

13.

$$\sin 2x \sin x + \cos 2x \cos x = 1$$

$$2\sin x \cos x \sin x + (\cos^2 x - \sin^2 x) \cos x = 1$$

$$2\sin^2 x \cos x + (1 - \sin^2 x - \sin^2 x) \cos x = 1$$

$$2\sin^2 x \cos x + (1 - 2\sin^2 x) \cos x = 1$$

$$\cos x (2\sin^2 x - 2\sin^2 x + 1) = 1$$

$$\cos x = 1$$

$$x = \cos^{-1}(1)$$

$$x = 0$$

14.

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

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

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

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

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

$$\cos x = 0$$

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

$$x = \cos^{-1}(0)$$

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

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

$$x = \cos^{-1}\left(-\frac{1}{2}\right)$$

$$x = \frac{2\pi}{3} \text{ and } \frac{4\pi}{3}$$

15.

$$\cos\left(\frac{\pi}{4} + x\right) + \cos\left(\frac{\pi}{4} - x\right) = 1$$

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

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

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

$$x = \cos^{-1}\left(\frac{\sqrt{2}}{2}\right)$$

$$x = \frac{\pi}{4} \text{ and } \frac{7\pi}{4}$$

16.

$$\sin\left(\frac{\pi}{4} + x\right) - \sin\left(\frac{\pi}{4} - x\right) = \frac{\sqrt{2}}{2}$$

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

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

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

$$x = \sin^{-1}\left(\frac{1}{2}\right)$$

$$x = \frac{\pi}{6} \text{ and } \frac{5\pi}{6}$$

$$17. B = \frac{\pi}{6}, \text{Period} = \frac{2\pi}{\frac{\pi}{6}} = 12 \text{ sec}$$

$$2 \cos\left(\frac{\pi}{6} t\right) = 1$$

$$\cos\left(\frac{\pi}{6} t\right) = \frac{1}{2}$$

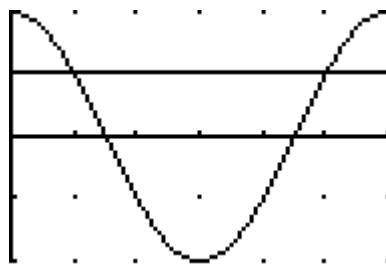
$$\frac{\pi}{6} t = \cos^{-1}\left(\frac{1}{2}\right)$$

$$\frac{\pi}{6} t = \frac{\pi}{3}$$

$$t = 2 \text{ sec}$$

$$\frac{\pi}{6} t = \frac{5\pi}{3}$$

$$t = 10 \text{ sec}$$



1.

$$\begin{aligned}\cos x &= 3 \cos x - 2 \\ 2 &= 2 \cos x \\ 1 &= \cos x \\ x &= \cos^{-1}(1) \\ x &= 0\end{aligned}$$

2.

$$\begin{aligned}2 \sin^2 x - 1 &= 0 \\ 2 \sin^2 x &= 1 \\ \sin^2 x &= \frac{1}{2} \\ \sin x &= \pm \frac{\sqrt{2}}{2}\end{aligned}$$

$$\begin{array}{l|l} \sin x = \frac{\sqrt{2}}{2} & \sin x = -\frac{\sqrt{2}}{2} \\ x = \sin^{-1}\left(\frac{\sqrt{2}}{2}\right) & x = \sin^{-1}\left(-\frac{\sqrt{2}}{2}\right) \\ x = \frac{\pi}{4} & x = -\frac{\pi}{4} \end{array}$$

3.

$$\begin{aligned}\sqrt{2} \sin x + 2 \sin x \cos x &= 0 \\ \sin x (\sqrt{2} + 2 \cos x) &= 0\end{aligned}$$

$$\begin{array}{l|l} \sin x = 0 & 2 \cos x + \sqrt{2} = 0 \\ x = \sin^{-1}(0) & \cos x = -\frac{\sqrt{2}}{2} \\ x = 0 \text{ and } \pi & x = \cos^{-1}\left(-\frac{\sqrt{2}}{2}\right) \\ & x = \frac{3\pi}{4} \text{ and } \frac{5\pi}{4} \end{array}$$

4.

$$\begin{aligned}\cos 2x + 3 \cos x - 1 &= 0 \\ \cos^2 x - \sin^2 x + 3 \cos x - 1 &= 0 \\ \cos^2 x - (1 - \cos^2 x) + 3 \cos x - 1 &= 0 \\ 2 \cos^2 x + 3 \cos x - 2 &= 0 \\ (2 \cos x - 1)(\cos x + 2) &= 0\end{aligned}$$

$$\begin{array}{l|l} 2 \cos x - 1 = 0 & \cos x + 2 = 0 \\ \cos x = \frac{1}{2} & \cos x = -2 \\ x = \cos^{-1}\left(\frac{1}{2}\right) & \text{Impossible} \\ x = \frac{\pi}{3} \text{ and } \frac{5\pi}{3} & \end{array}$$

5.

$$\begin{aligned}4 \sin^2 x - 4 \sin x + 1 &= 0 \\ (2 \sin x - 1)^2 &= 0 \\ 2 \sin x - 1 &= 0 \\ \sin x &= \frac{1}{2} \\ x &= \sin^{-1}\left(\frac{1}{2}\right) \\ x = \frac{\pi}{6} \text{ and } x = \frac{5\pi}{6}\end{aligned}$$

6.

$$\begin{aligned}\cos 2x + \sin x &= 1 \\ \cos^2 x - \sin^2 x + \sin x &= 1 \\ (1 - \sin^2 x) - \sin^2 x + \sin x - 1 &= 0 \\ -2 \sin^2 x + \sin x &= 0 \\ 2 \sin^2 x - \sin x &= 0 \\ \sin x (2 \sin x - 1) &= 0\end{aligned}$$

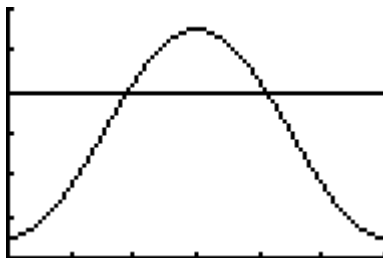
$$\begin{array}{l|l} \sin x = 0 & 2 \sin x - 1 = 0 \\ x = \sin^{-1}(0) & \sin x = \frac{1}{2} \\ x = 0 \text{ and } \pi & x = \sin^{-1}\left(\frac{1}{2}\right) \\ & x = \frac{\pi}{6} \text{ and } \frac{5\pi}{6} \end{array}$$

7.

$$\begin{aligned}3 \cos 2x - 5 \cos x &= 1 \\ 3(\cos^2 x - \sin^2 x) - 5 \cos x &= 1 \\ 3(\cos^2 x - (1 - \cos^2 x)) - 5 \cos x &= 1 \\ 3(2 \cos^2 x - 1) - 5 \cos x - 1 &= 0 \\ 6 \cos^2 x - 3 - 5 \cos x - 1 &= 0 \\ 6 \cos^2 x - 5 \cos x - 4 &= 0 \\ (2 \cos x + 1)(3 \cos x - 4) &= 0\end{aligned}$$

$$\begin{array}{l|l} 2 \cos x + 1 = 0 & 3 \cos x - 4 = 0 \\ \cos x = -\frac{1}{2} & \cos x = \frac{4}{3} \\ x = \cos^{-1}\left(-\frac{1}{2}\right) & x = \cos^{-1}\left(\frac{4}{3}\right) \\ x = \frac{2\pi}{3} + 2\pi k \text{ and} & \text{Impossible} \\ x = \frac{4\pi}{3} + 2\pi k & \end{array}$$

13. From graph, the points of intersection are  $t = 0.4732$  and  $t = 1.0267$



8.

$$\begin{aligned}2 \sin^2 x - 5 \sin x + 2 &= 0 \\ (2 \sin x - 1)(\sin x - 2) &= 0\end{aligned}$$

$$\begin{array}{l|l} 2 \sin x - 1 = 0 & \sin x - 2 = 0 \\ \sin x = \frac{1}{2} & \sin x = 2 \\ x = \sin^{-1}\left(\frac{1}{2}\right) & \text{Impossible} \\ x = \frac{\pi}{6} + 2\pi k \text{ and} & \\ x = \frac{5\pi}{6} + 2\pi k & \end{array}$$

9.

$$\begin{aligned}3 \sec^2 x - 4 &= 0 \\ \frac{3}{\cos^2 x} &= 4 \\ \frac{3}{4} &= \cos^2 x \\ \pm \frac{\sqrt{3}}{2} &= \cos x\end{aligned}$$

$$\begin{array}{l|l} \cos x = \frac{\sqrt{3}}{2} & \cos x = -\frac{\sqrt{3}}{2} \\ x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right) & x = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right) \\ x = \frac{\pi}{6} + 2\pi k \text{ and} & x = \frac{5\pi}{6} + 2\pi k \text{ and} \\ x = -\frac{\pi}{6} + 2\pi k & x = \frac{7\pi}{6} + 2\pi k \end{array}$$

10.

$$\begin{aligned}\tan x (\tan x - 1) &= 0 \\ \tan x = 0 & \tan x - 1 = 0 \\ x = \tan^{-1}(0) & \tan x = 1 \\ x = 0 + \pi k & x = \tan^{-1} 1 \\ & x = \frac{\pi}{4} + \pi k \text{ and} \end{aligned}$$

11.

$$6 \cos^2 x + 5 \cos x + 1 = 0$$

Find intersections with the x axis

$$x = 2.094 \text{ and } x = 4.373$$

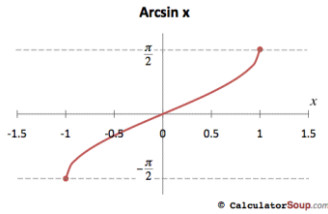
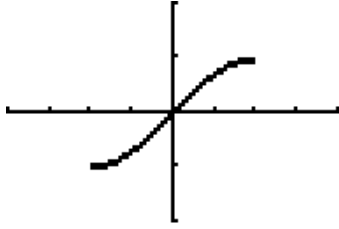
12.

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

Find intersections with the x axis

$$x = 1.030$$

1.



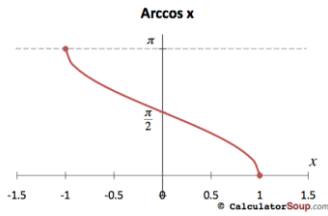
$$D: -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$$

$$D: -1 \leq x \leq 1$$

$$R: -1 \leq x \leq 1$$

$$R: -\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$$

2.



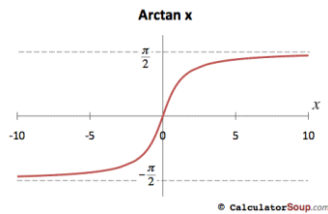
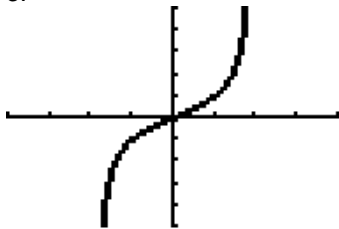
$$D: 0 \leq x \leq \pi$$

$$D: -1 \leq x \leq 1$$

$$R: -1 \leq x \leq 1$$

$$R: 0 \leq x \leq \pi$$

3.



$$D: -\frac{\pi}{2} < x < \frac{\pi}{2}$$

$$D: \text{All Real Numbers}$$

$$R: \text{All Real Numbers}$$

$$R: -\frac{\pi}{2} < x < \frac{\pi}{2}$$

4.

$$\arctan(-1) =$$

$$-\frac{\pi}{4}$$

5.

$$\sin^{-1} 1$$

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

6.

$$\cos^{-1}\left(\tan\frac{\pi}{4}\right)$$

$$\cos^{-1}(1)$$

$$0$$

7. False

8. True

9. False

10.

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

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

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

$$\cos x = 0$$

$$x = \cos^{-1}(0)$$

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

$$x = \frac{\pi}{2} + 2\pi k \text{ and}$$

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

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

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

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

$$x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right)$$

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

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

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

11.

$$\sin x + \sin x \cos x = 0$$

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

$$\sin x = 0$$

$$x = \sin^{-1}(0)$$

$$x = 0$$

$$x = 0 + 2\pi k \text{ and}$$

$$x = \pi + 2\pi k \text{ or}$$

$$x = 0 + \pi k$$

$$1 + \cos x = 0$$

$$\cos x = -1$$

$$x = \cos^{-1}(-1)$$

$$x = \pi$$

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

12.

$$2 \sin^2 x + 3 \sin x - 2 = 0$$

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

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

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

$$x = \sin^{-1}\left(\frac{1}{2}\right)$$

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

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

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

$$\sin x + 2 = 0$$

$$\sin x = -2$$

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

Impossible

13.

$$2 \sin x + 1 < 0$$

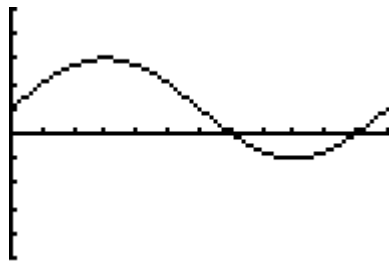
$$\sin x < -\frac{1}{2}$$

$$x < \sin^{-1}\left(-\frac{1}{2}\right)$$

$$x = \frac{7\pi}{6} \text{ and } x = \frac{11\pi}{6}$$

$$\text{so } \frac{7\pi}{6} < x < \frac{11\pi}{6} \text{ or}$$

$$3.665 < x < 5.760$$



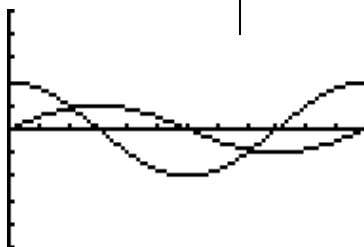
14.

$$\sin x > 2 \cos x$$

The graphs intersect each other

At  $x = 1.1071$  and  $x = 4.2487$

So  $1.107 < x < 4.249$



15.

$$\cos^2 x + \cos 2x \leq \frac{5}{4}$$

$$\cos^2 x + \cos 2x = \frac{5}{4}$$

$$\cos^2 x + (\cos^2 x - \sin^2 x) = \frac{5}{4}$$

$$2 \cos^2 x - (1 - \cos^2 x) = \frac{5}{4}$$

$$3 \cos^2 x - 1 = \frac{5}{4}$$

$$3 \cos^2 x = \frac{9}{4}$$

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

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

$$x = \cos^{-1}\left(\frac{\sqrt{3}}{2}\right), x = \cos^{-1}\left(-\frac{\sqrt{3}}{2}\right)$$

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

$$\text{So, } \frac{\pi}{6} \leq x \leq \frac{5\pi}{6}, \text{ or } \frac{7\pi}{6} \leq x \leq \frac{11\pi}{6}$$

$$0.524 \leq x \leq 2.618 \text{ or } 3.665 \leq x \leq 5.760$$

