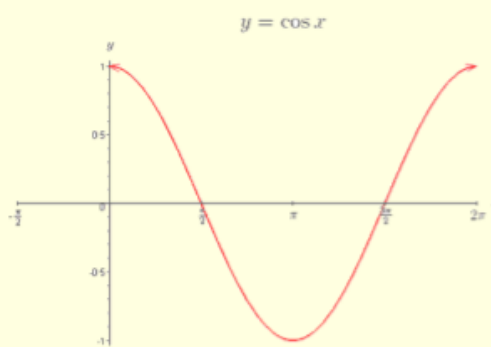
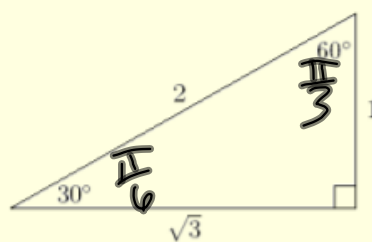
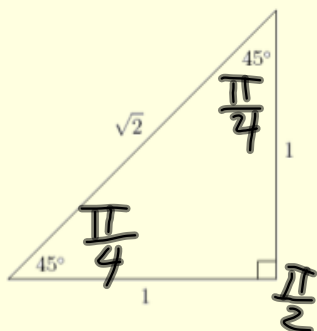


# 5.1b/c Solving Trigonometric Equations

(by hand and with a calculator)

## 5.1 bc Solving Trig Eqs



## 5.1 bc Solving Trig Eqs

Solve each equation by hand, giving your answers in radians and degrees.

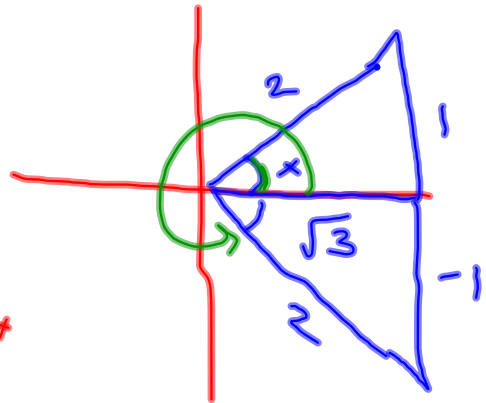
1.

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

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

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

$$x = 30^\circ, 330^\circ$$
$$\frac{\pi}{6}, \frac{11\pi}{6}$$

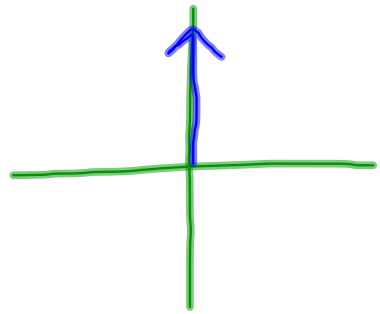


$$\text{ref } \angle = 30^\circ$$
$$\frac{\pi}{6}$$

$$\sin x - 1 = 0$$

$$\sin x = 1 \left(\frac{1}{1}\right)_H^\circ$$

$$x = 90^\circ, \frac{\pi}{2}$$

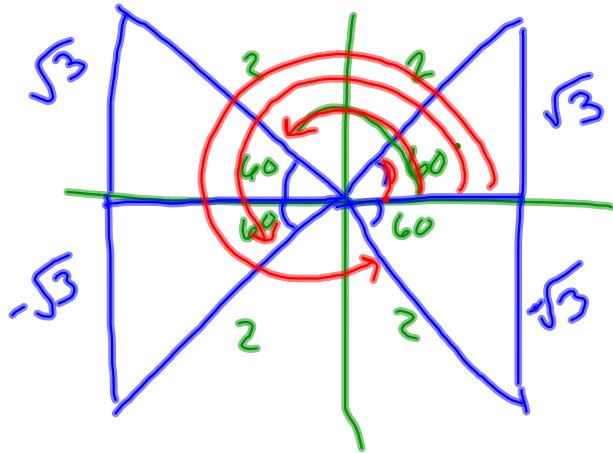


$$4 \sin^2 x - 3 = 0$$

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

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

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



$$x = 60^\circ, 120^\circ, 240^\circ, 300^\circ$$

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

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

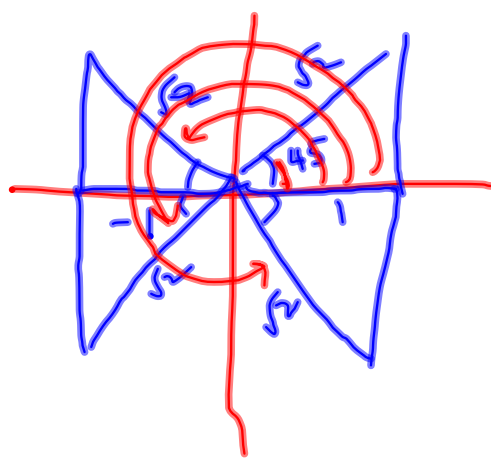
$$2\cos^2 x = 1$$

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

$$\cos x = \pm \frac{1}{\sqrt{2}} \quad \begin{matrix} A \\ H \end{matrix}$$

$$x = 45^\circ, 135^\circ, 225^\circ, 315^\circ$$

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



## 5.1 bc Solving Trig Eqs

$$\underline{\cos x} - 2 \underline{\cos x} \sin x = 0$$

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

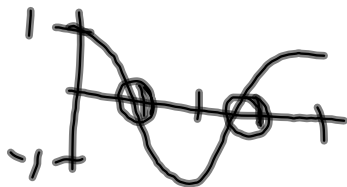
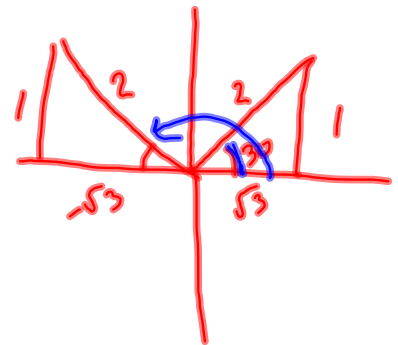
$$\cos x = 0 \quad \text{or} \quad 1 - 2 \sin x = 0$$

$$x = \frac{\pi}{2}, 90^\circ$$

$$\frac{3\pi}{2}, 270^\circ$$

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

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



$$x = 30^\circ, 150^\circ$$

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

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

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

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

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

$$2\sin x - 1 = 0 \text{ or } \sin x + 1 = 0$$

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

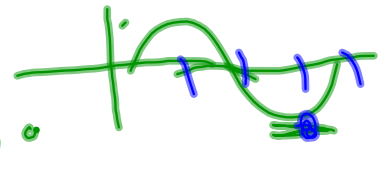
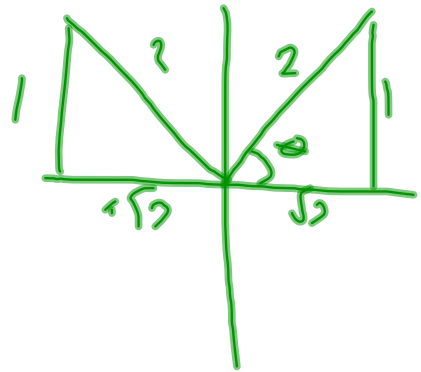
$$\sin x = -1$$

$$x = 30^\circ, 150^\circ$$

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

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

$$270^\circ$$





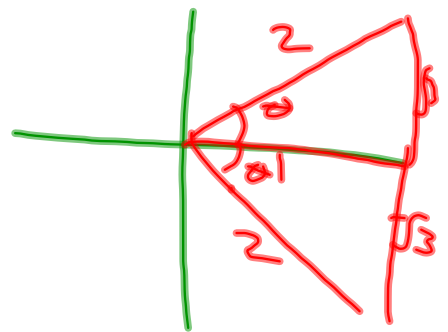
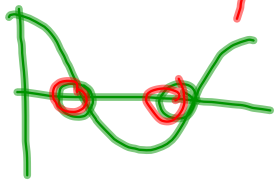
$$2 \cos^2 x - \cos x = 0$$

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

$$\cos x = 0 \text{ or } 2 \cos x - 1 = 0$$

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

$$90^\circ, 270^\circ$$



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

$$x = 60^\circ, 300^\circ$$

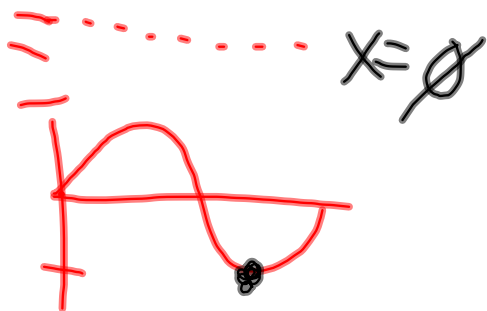
$$\frac{\pi}{3}, \frac{5\pi}{3}$$

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

$$(\sin x - 3)(\sin x + 1) = 0$$

$$\sin x - 3 = 0 \text{ or } \sin x + 1 = 0$$

$$\sin x = 3$$



$$\sin x = -1$$

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

$$270^\circ$$

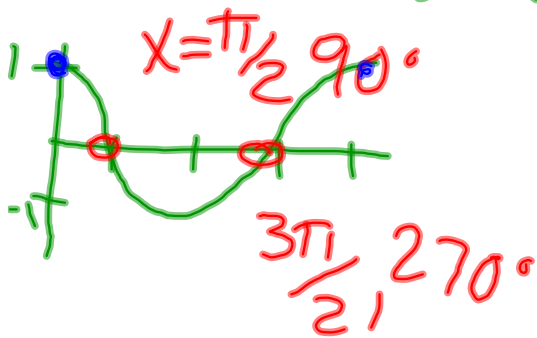
$$\sin^2 x + \underline{\cos 2x} - \cos x = 0$$

$$\cancel{\sin^2 x} + (\cos^2 x - \cancel{\sin^2 x}) - \cos x = 0$$

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

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

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



$$\cos x = 1$$

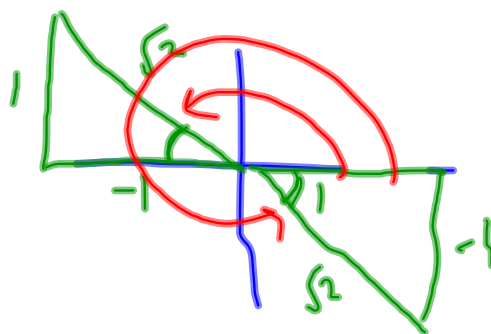
$$x = 0, 2\pi, 360^\circ$$

## 5.1 bc Solving Trig Eqs

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

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

$$\tan x = -1$$



$$x = 135^\circ, 315^\circ$$

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

$$\underline{\cos 2x} + 3 \cos x - 1 = 0$$

$$\cdot (2 \cos^2 x - 1) + 3 \cos x - 1 = 0$$

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

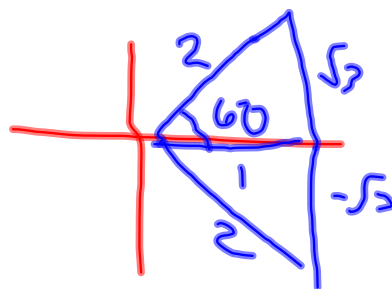
$$(2 \cos x - 1)(\cos x + 2) = 0$$

$$2 \cos x - 1 = 0 \quad \text{or} \quad \cos x + 2 = 0$$

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

$$x = 60^\circ, 300^\circ \quad x = \emptyset$$

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



$$\sin 2t = \cos t$$

$$2 \cos t \sin t = \cos t$$

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

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

$$\cos t = 0 \text{ or } 2 \sin t - 1 = 0$$

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

## 5.1c Solving Trigonometric Equations by Graphing

Solve each equation by graphing for  $0 \leq x < 2\pi$ . Draw a fully-labeled sketch for each equation. Find each solution to three significant figures.

1.  $\cos 2x = 1 - \sin x$

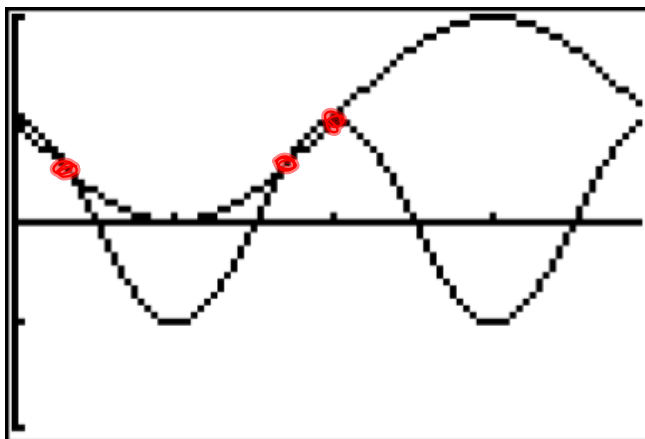
$$x = 0$$

$$0.523$$

$$2.62$$

$$3.14 \text{ (}\pi\text{)}$$

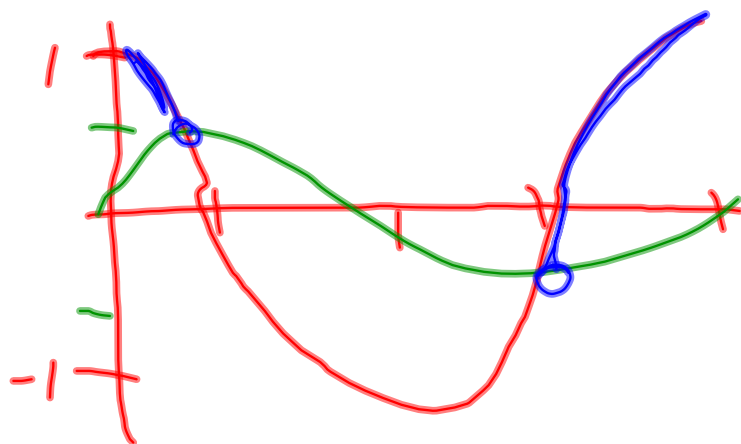
$$6.28 \text{ (}2\pi\text{)}$$



## 5.1 bc Solving Trig Eqs

Solve each inequality by graphing for . Draw a fully-labeled sketch for each equation. Find each solution to three significant figures.

5.  $\cos x > \frac{1}{2} \sin x$



$$0 \leq x \leq 1.11$$
$$4.25 \leq x \leq 2\pi$$



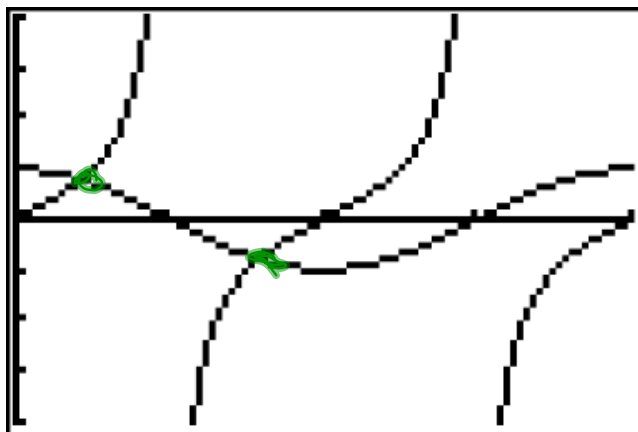
## 5.1 bc Solving Trig Eqs

Solve each equation by graphing in the interval  $[0, 2\pi)$ . Draw a fully-labeled sketch for each equation. Find each solution to the nearest tenth of a degree.

9.  $\tan x = \cos x$

$$x = 38.2^\circ$$

$$141.8^\circ$$



## 5.1 bc Solving Trig Eqs

Graph each inequality in the interval  $[0, 2\pi)$ . Draw a fully-labeled sketch for each equation. Find each solution to the nearest tenth of a degree.

13.  $\sin 3x \leq \sin x$

Homework Assignment  
Finish WS, both sections