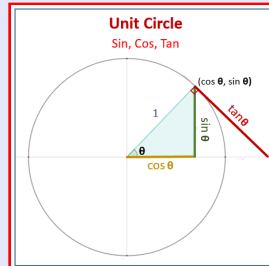


Trigonometry

Lecture 34



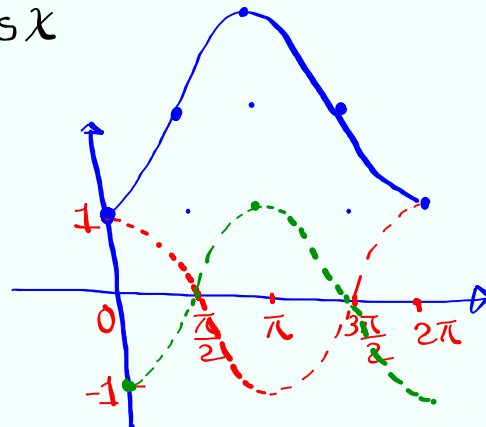
Feb 19-8:47 AM

Graph $y = 2 - \cos x$

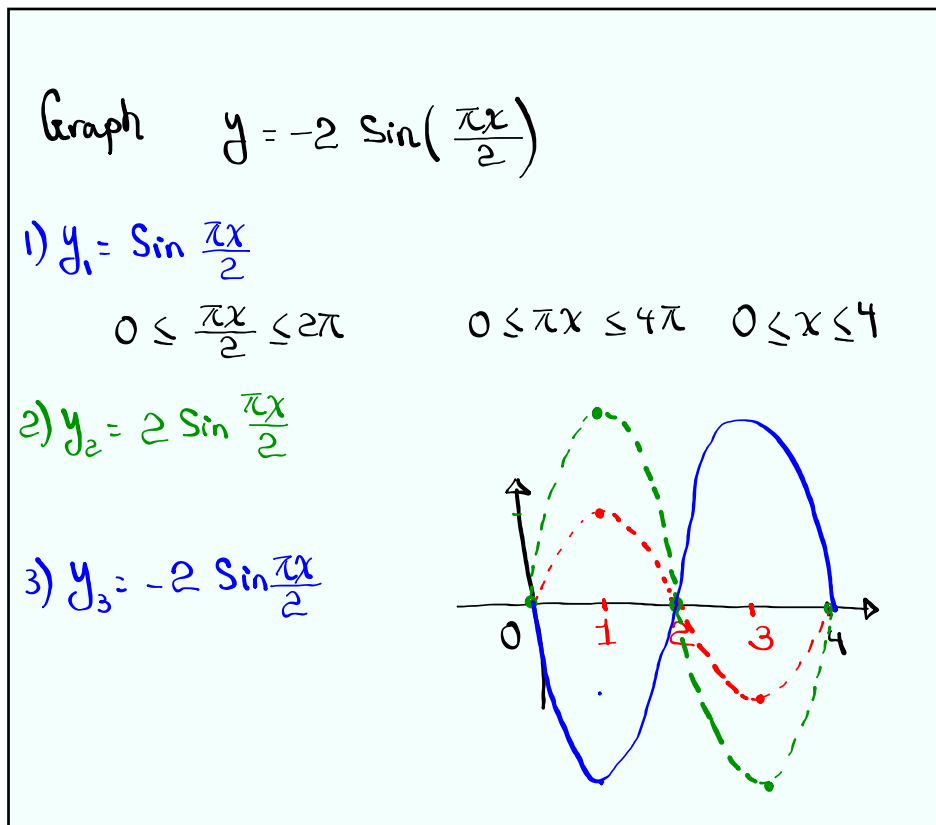
1) $y_1 = \cos x$

2) $y_2 = -\cos x$

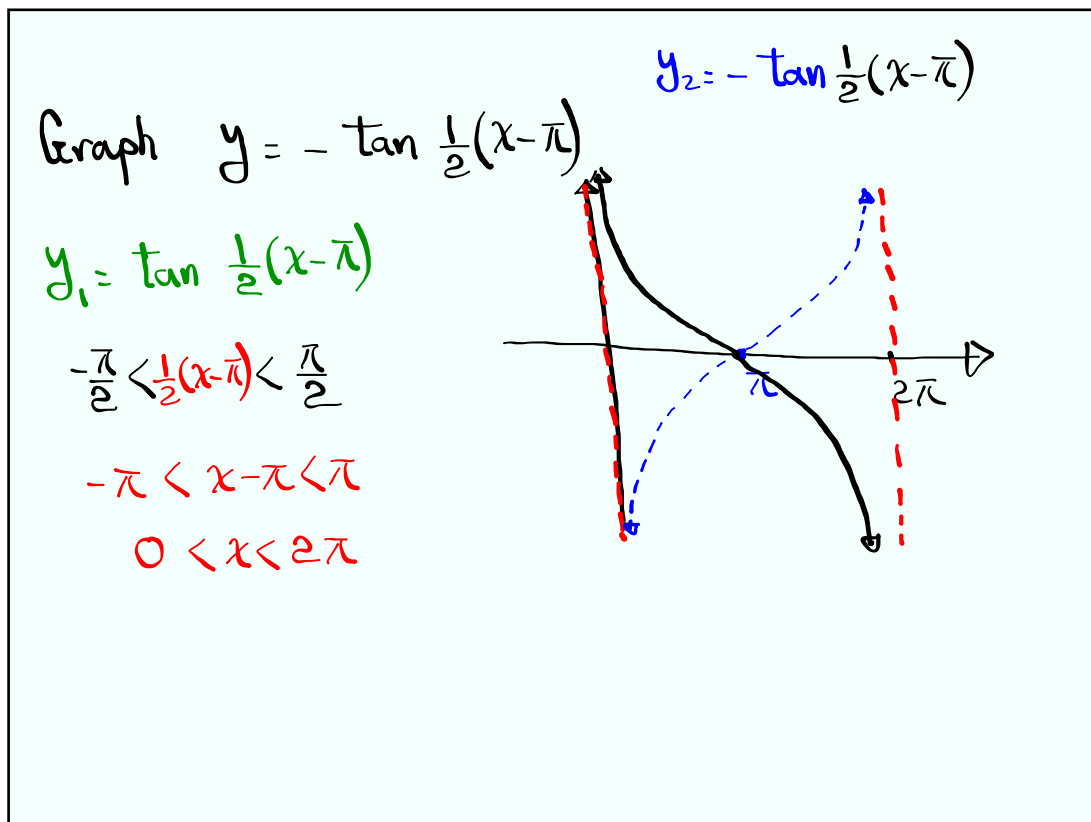
3) $y_3 = 2 - \cos x$



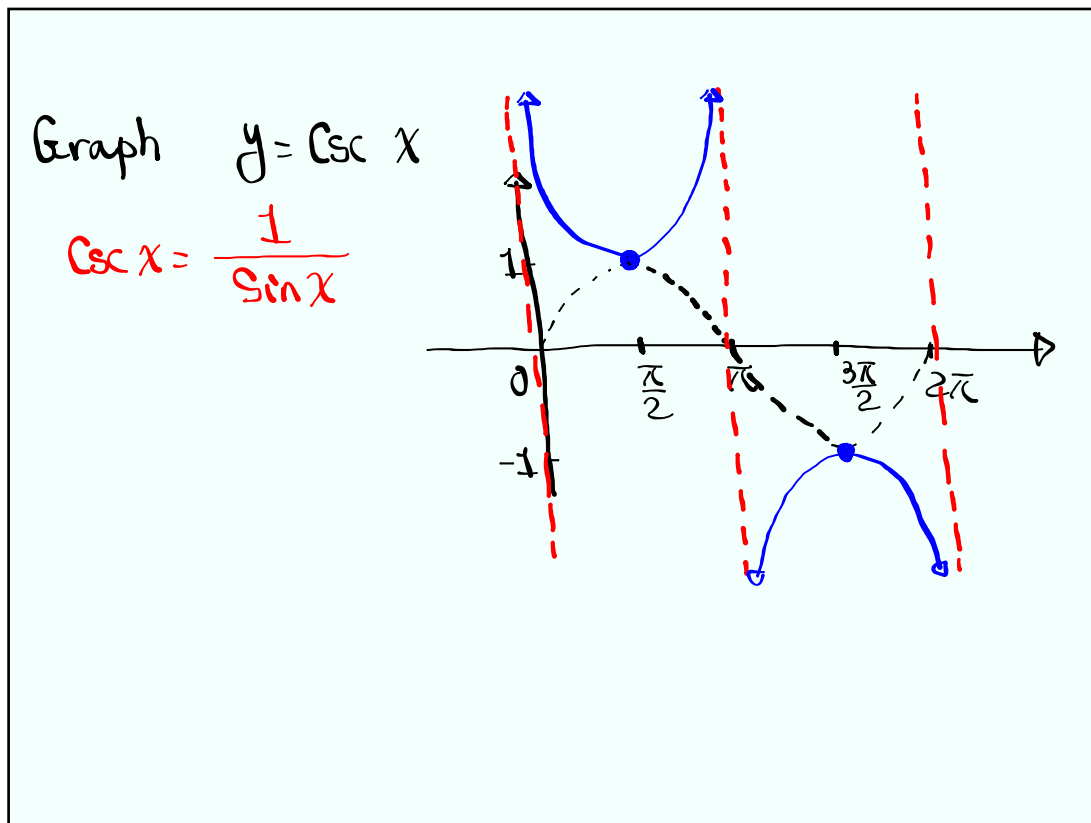
Oct 29-10:26 AM



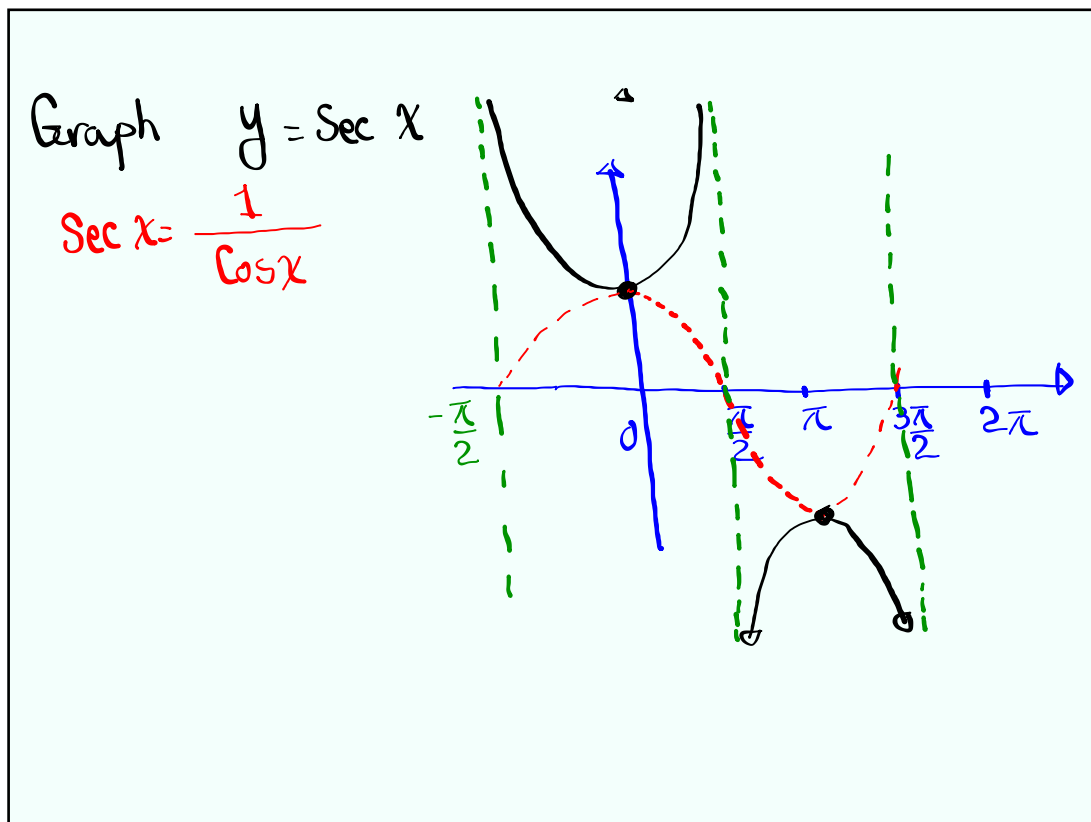
Oct 29-10:30 AM



Oct 29-10:35 AM



Oct 29-10:40 AM



Oct 29-10:44 AM

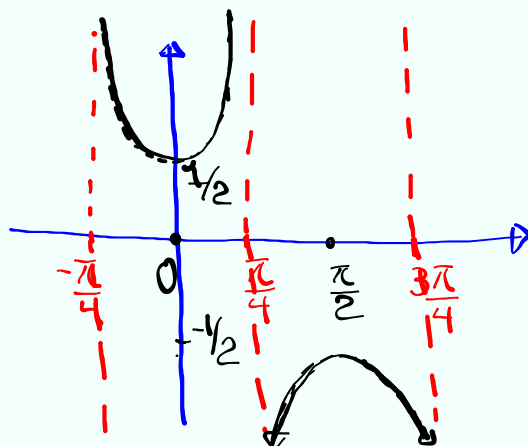
Graph $y = \frac{1}{2} \csc\left(2x + \frac{\pi}{2}\right)$

$$0 < 2x + \frac{\pi}{2} < 2\pi$$

$$0 < 4x + \pi < 4\pi$$

$$-\pi < 4x < 3\pi$$

$$-\frac{\pi}{4} < x < \frac{3\pi}{4}$$

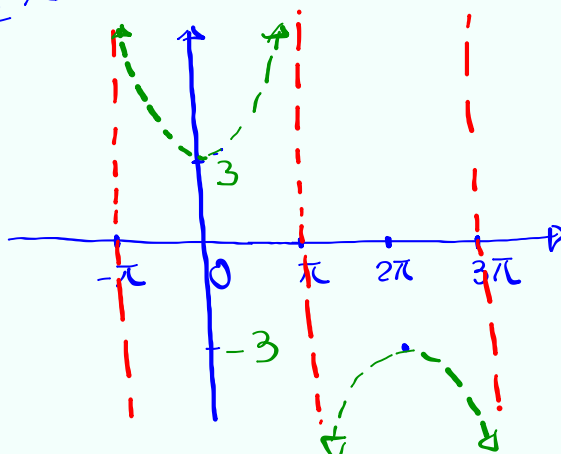


Oct 29-10:49 AM

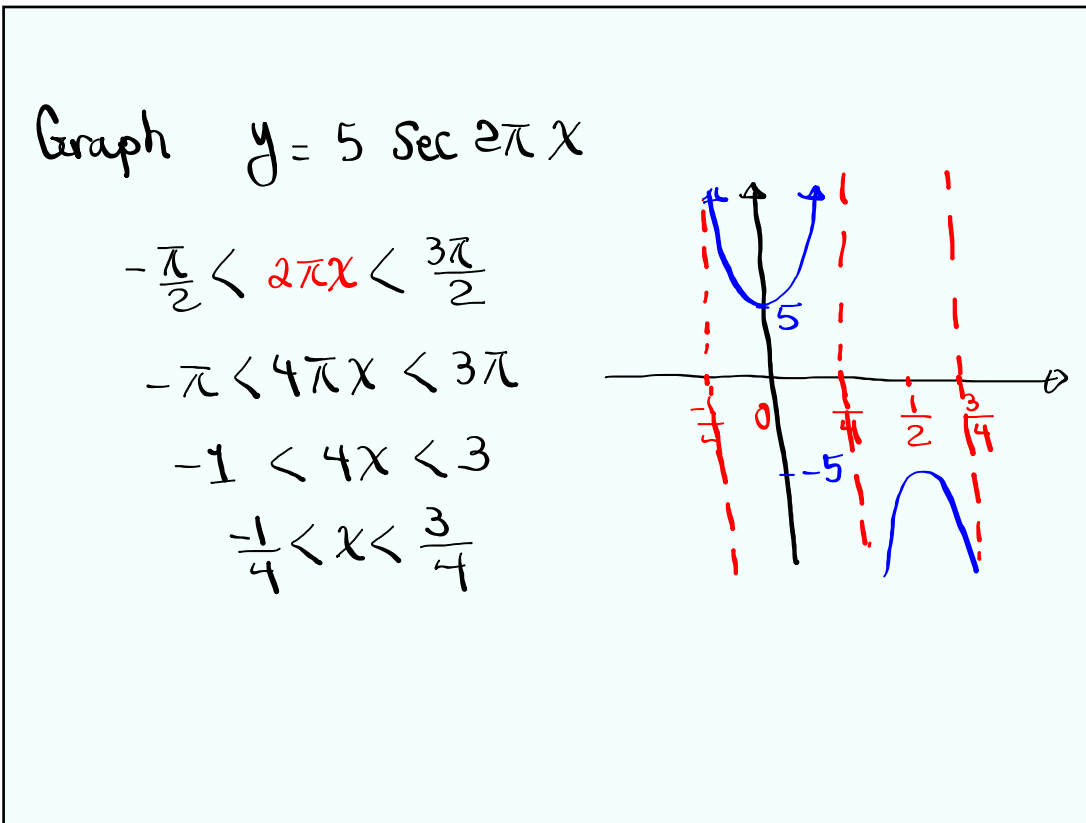
Graph $y = 3 \sec \frac{1}{2} x$

$$-\frac{\pi}{2} < \frac{1}{2} x < \frac{3\pi}{2}$$

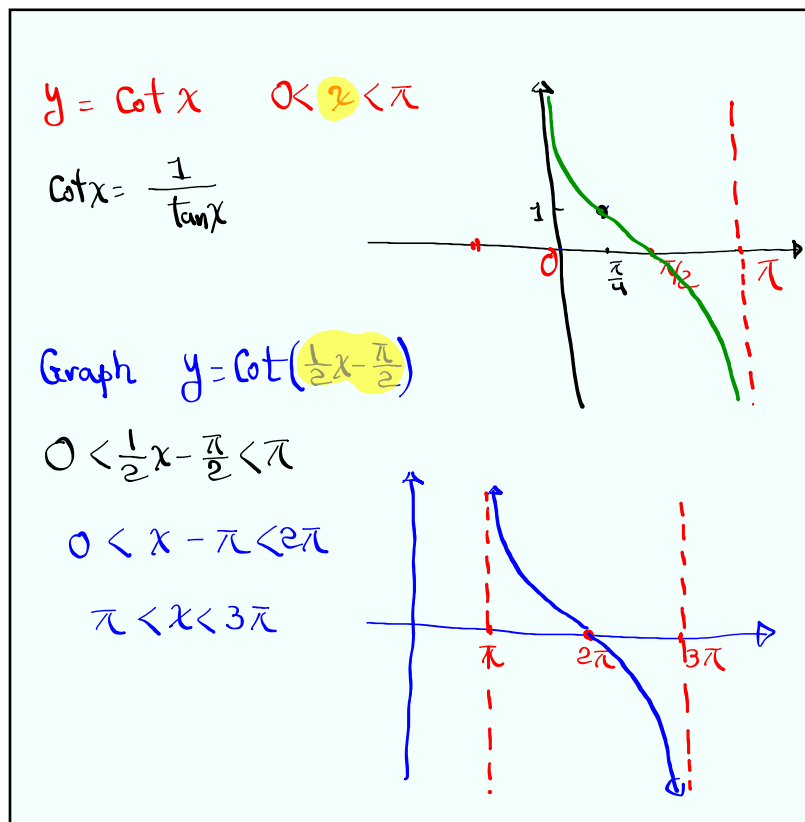
$$-\pi < x < 3\pi$$



Oct 29-10:54 AM



Oct 29-10:58 AM



Oct 29-11:03 AM

Solve $\sin^2 x - 1 = 0$ for $0^\circ < x < 360^\circ$

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

$\sin x = \pm \sqrt{1}$ $x = 90^\circ$ $x = 270^\circ$

$\sin x = \pm 1$

$\sin \leftrightarrow y$
 $\cos \leftrightarrow x$

Oct 29-11:11 AM

Solve $2 \cos^2 x - \cos x - 1 = 0$ for $0 \leq x < 2\pi$

Quadratic
 $ax^2 + bx + c = 0$

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

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

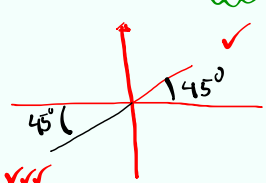
R.A. $60^\circ = \frac{\pi}{3}$ $\cos x = \frac{1}{2}$ $\cos x = 1$ $x = 0$

QII $\rightarrow \pi - \text{R.A.} = \pi - \frac{\pi}{3} = \frac{2\pi}{3}$ $\{0, \frac{2\pi}{3}, \frac{4\pi}{3}\}$

QIII $\rightarrow \pi + \text{R.A.} = \pi + \frac{\pi}{3} = \frac{4\pi}{3}$

Oct 29-11:14 AM

Solve $\tan(2x) = 1$ for $0^\circ \leq x < 360^\circ$



QI Angle = RA
QII Angle = $180^\circ - RA$
QIII Angle = $180^\circ + RA$
QIV Angle = $360^\circ - RA$

R.A. 45° $2x = 45^\circ + n \cdot 180^\circ$
 $2x = 180^\circ + 45^\circ + n \cdot 180^\circ$

$x = 22.5^\circ + n \cdot 90^\circ$ $n=0$ $x = 22.5^\circ, 112.5^\circ$
 $x = 112.5^\circ + n \cdot 90^\circ$ $n=1$ ~~$x = 112.5^\circ, 202.5^\circ$~~
 $n=2$ ~~$x = 202.5^\circ, 292.5^\circ$~~
 $n=3$ ~~$x = 292.5^\circ, 382.5^\circ$~~

$\{22.5^\circ, 112.5^\circ, 202.5^\circ, 292.5^\circ\}$

Oct 29-11:23 AM


Solve $\sin \frac{1}{2}x = \frac{1}{2}$ $0^\circ \leq x < 360^\circ$

R.A. 30°

QI $\frac{1}{2}x = 30^\circ + n \cdot 360^\circ \rightarrow x = 60^\circ + n \cdot 720^\circ$
 QII $\frac{1}{2}x = 180^\circ - 30^\circ + n \cdot 360^\circ \rightarrow x = 300^\circ + n \cdot 720^\circ$

$n=0$ $x = 60^\circ, 300^\circ$ $\{60^\circ, 300^\circ\}$
 $n=1$ ~~$x = 780^\circ, 1020^\circ$~~

$x = 60^\circ$ $\sin \frac{1}{2}(60^\circ) = \sin 30^\circ = \frac{1}{2} \checkmark$
 $x = 300^\circ$ $\sin \frac{1}{2}(300^\circ) = \sin 150^\circ = \sin 30^\circ = \frac{1}{2} \checkmark$



Oct 29-11:33 AM

Exact Value of $\tan 15^\circ$

$$\begin{aligned}
 \tan 15^\circ &= \tan(45^\circ - 30^\circ) && \tan(A-B) \\
 &= \frac{\tan 45^\circ - \tan 30^\circ}{1 + \tan 45^\circ \tan 30^\circ} && = \frac{\tan A - \tan B}{1 + \tan A \tan B} \\
 &= \frac{1 - \frac{\sqrt{3}}{3}}{1 + 1 \cdot \frac{\sqrt{3}}{3}} = \frac{3 - \sqrt{3}}{3 + \sqrt{3}} \cdot \frac{3 - \sqrt{3}}{3 - \sqrt{3}} \\
 &= \frac{9 - 3\sqrt{3} - 3\sqrt{3} + 3}{9 - \cancel{3\sqrt{3}} + \cancel{3\sqrt{3}} - 3} \\
 &= \frac{12 - 6\sqrt{3}}{6} = \frac{\cancel{6}(2 - \sqrt{3})}{\cancel{6}} = \boxed{2 - \sqrt{3}}
 \end{aligned}$$

Oct 29-11:39 AM