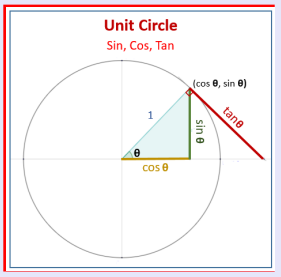
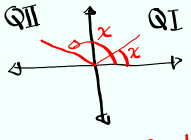
Trigonometry

Lecture 35



Feb 19-8:47 AM

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

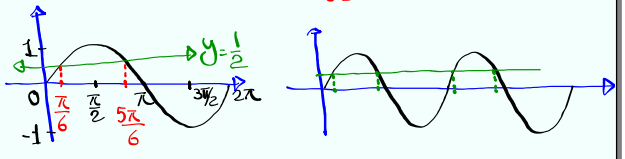


R.A. $\sin\theta = \frac{1}{2}$ $\theta = 30^\circ, \frac{\pi}{6}$

QI $x = R.A.$ $x = \frac{\pi}{6}$

QII $x = \pi - RA.$ $x = \pi - \frac{\pi}{6} = \frac{5\pi}{6}$

over $[0, 2\pi)$ $\rightarrow \left\{\frac{\pi}{6}, \frac{5\pi}{6}\right\}$



General Solutions

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

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

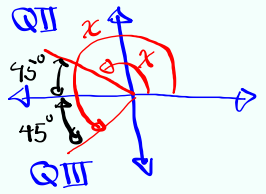
for Sin & Cos
Period is 2π.

Oct 31-10:25 AM

Solve $\sqrt{2}\cos x + 1 = 0$

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

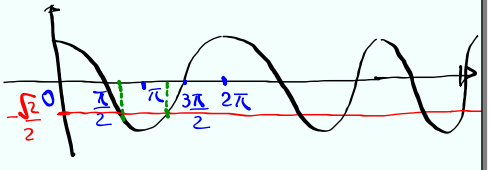
$\cos x = \frac{-1}{\sqrt{2}}$ $\quad \cos x = -\frac{\sqrt{2}}{2}$ $\quad RA = 45°$



QII $\quad x = 180° - 45°$

QIII $\quad x = 180° + 45°$

in $[0°, 360°)$ $\rightarrow$ $x = 135°$, $x = 225°$



General Solutions

$x = 135° + K \cdot 360°$

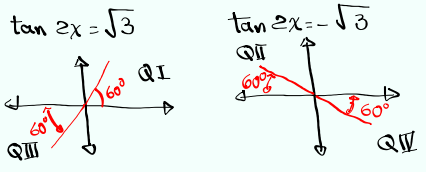
$x = 225° + K \cdot 360°$

Oct 31-10:32 AM

Solve $\tan^2 2x - 3 = 0$

$\tan^2 2x = 3$

$\tan 2x = \pm\sqrt{3}$



QI $\quad 2x = 60° + K \cdot 180° \Rightarrow x = 30° + K \cdot 90°$

QII $\quad 2x = 180° - 60° + K \cdot 180° \Rightarrow x = 60° + K \cdot 90°$

QIII $\quad 2x = 180° + 60° + K \cdot 180° \Rightarrow x = 120° + K \cdot 90°$

QIV $\quad 2x = 360° - 60° + K \cdot 180° \Rightarrow x = 150° + K \cdot 90°$

Period for tan is π or $180°$

Find all solutions $[0°, 360°)$

$K = 0 \rightarrow 30°, 60°, 120°, 150°$

$K = 1 \rightarrow \cancel{120°}, \cancel{150°}, 210°, 240°$

$K = 2 \rightarrow \cancel{210°}, \cancel{240°}, 300°, 330°$

$K = 3 \rightarrow \cancel{300°}, \cancel{330°}, 390°$

$30°, 60°, 120°, 150°, 210°, 240°, 300°, 330°.$

Oct 31-10:39 AM

Solve $\csc \frac{1}{2}x = 2$

$\sin \frac{1}{2}x = \frac{1}{2}$ QI, QII RA. 30°

General Soln.

QI $\frac{1}{2}x = 30° + K \cdot 360° \Rightarrow x = 60° + K \cdot 720°$

QII $\frac{1}{2}x = 180° - 30° + K \cdot 360° \Rightarrow x = 300° + K \cdot 720°$

over $[0°, 360°) \rightarrow 60°, 300°$ K=0

outside of K=1 $[0°, 360°)$

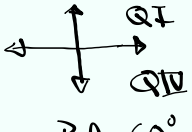
Oct 31-10:51 AM

Solve $2\cos^2 x - 7\cos x + 3 = 0$

Hint: Use Factoring

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

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



R.A. 60°

$\cos x = 3$ No solution

There are Solutions

QI $x = 60° + K \cdot 360°$

QIV $x = 360° - 60° + K \cdot 360°$

General Solns

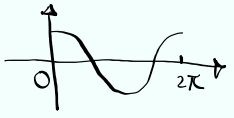
$60° + K \cdot 360°$,

$300° + K \cdot 360°$

Oct 31-10:57 AM

Graph $y = \frac{3}{4}\cos\left(2x + \frac{2\pi}{3}\right)$

$y = \frac{3}{4}\cos\left[2\left(x + \frac{\pi}{3}\right)\right]$



$0 \le 2x + \frac{2\pi}{3} \le 2\pi$

Multiply by 3

$0 \le 6x + 2\pi \le 6\pi$

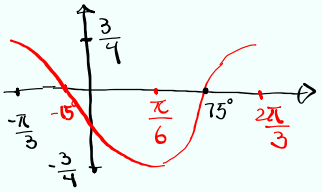
Subtract 2π

$-2\pi \le 6x \le 4\pi$

Divide by 6

$-\frac{2\pi}{6} \le x \le \frac{4\pi}{6}$

$-\frac{\pi}{3} \le x \le \frac{2\pi}{3}$

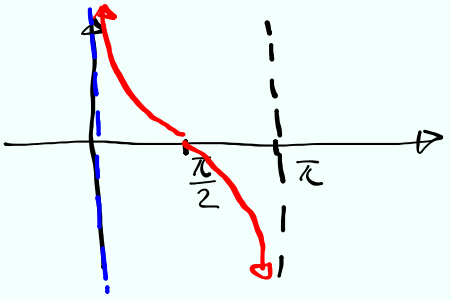


Oct 31-11:02 AM

Graph $y = \cot\left(\frac{\pi x}{2}\right)$

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

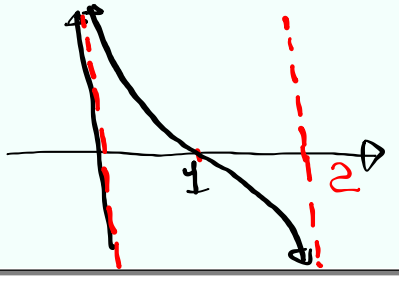
$y = \cot x$



$0 < \pi x < 2\pi$

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

$0 < x < 2$



Oct 31-11:11 AM

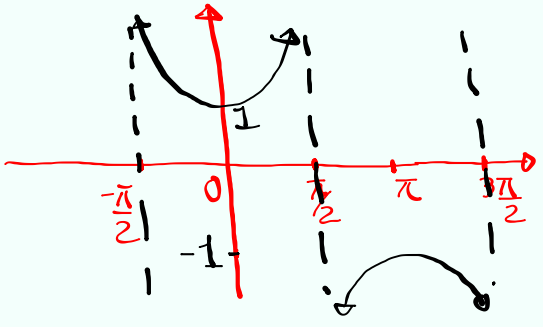
Graph $y = \sec\left(\frac{\pi x}{4}\right)$

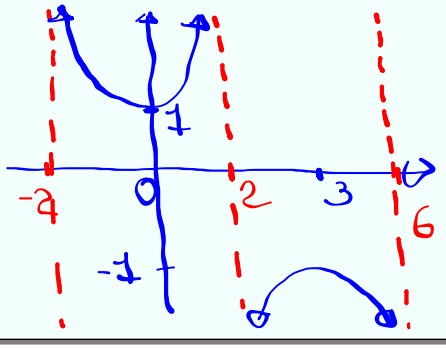
$-\frac{\pi}{2} < \frac{\pi x}{4} < \frac{3\pi}{2}$

$y = \sec x$

$-2\pi < \pi x < 6\pi$

$-2 < x < 6$





Oct 31-11:14 AM