Section 5.3: The Tangent Function

x	$-\pi/2$	$-\pi/4$	0	$\pi/4$	$\pi/2$	$3\pi/4$	π	$5\pi/4$	$3\pi/2$	$7\pi/4$
sin x	-1	$-\sqrt{2}/2$	0	$\sqrt{2}/2$	1	$\sqrt{2}/2$	0	$-\sqrt{2}/2$	-1	$-\sqrt{2}/2$
cos x	0	$\sqrt{2}/2$	1	$\sqrt{2}/2$	0	$-\sqrt{2}/2$	-1	$-\sqrt{2}/2$	0	$\sqrt{2}/2$
tan x	U	-1	0	1	U	-1	0	1	U	-1
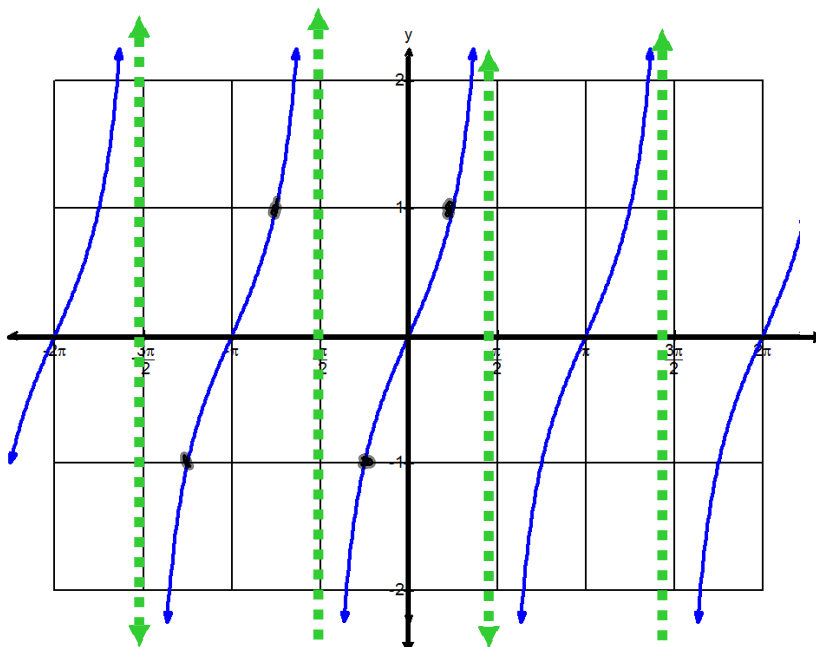
Vertical Asymptotes - occur every $\pi/2 + \pi k$, k E I
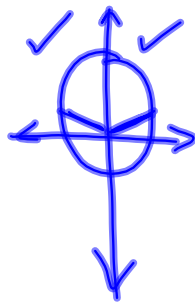
Period = π

No max or min values

Zeros - $0 + \pi k, k \in I$

Domain - $\{x/x \neq \pi/2 + \pi k, k \in I\}$

Section 5.4: Equations and Graphs of Trigonometric Functions

Example 1: Determine the solutions for the trig equation

$$2\sin x - 1 = 0, \ 0 \le x \le 2\pi$$

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

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

$$x = \frac{\pi}{6} \ \& \ \frac{5\pi}{6}$$

$$2\cos^2 x - 1 = 0 \quad \text{for the interval} \quad 0 \le x \le 360$$

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

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

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

$$x = \cos^{-1}\left(\frac{1}{\sqrt{2}}\right) \qquad x = \cos^{-1}\left(-\frac{1}{\sqrt{2}}\right)$$
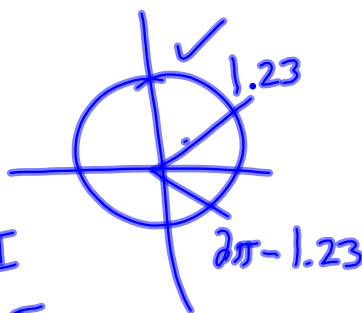
$$x = 45°, 315° \qquad\qquad = 135°, 225°$$

Example 2: Determine the general solution for

$$16 = 6\cos\frac{\pi}{6}x + 14$$ (round to the nearest hundreth)

$$\cos\frac{\pi}{6}x = \frac{1}{3}$$

$$\frac{\pi}{6}x = \cos^{-1}\left(\frac{1}{3}\right)$$

$$\frac{\pi}{6}x = \begin{cases} 1.23 + 2\pi K, K \in I \\ 5.05 + 2\pi K, K \in I \end{cases}$$

$$x = \begin{cases} 2.35 + 12K, K \in I \\ 9.64 + 12K, K \in I \end{cases}$$
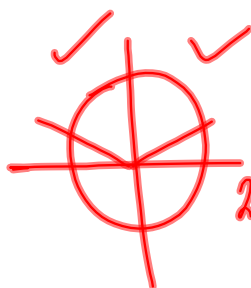
1.23

$2\pi - 1.23$

$$10 = 6 sin \frac{\pi}{4} x + 8$$

$$Sin \frac{\pi}{4} x = \frac{1}{3}$$

$$\frac{\pi}{4} x = Sin^{-1}\left(\frac{1}{3}\right)$$

$$\frac{\pi}{4} x = \begin{cases} 0.34 + 2\pi k, k \in I & \cdot 4/\pi \\ 2.80 + 2\pi k, k \in I & \cdot 4/\pi \end{cases}$$

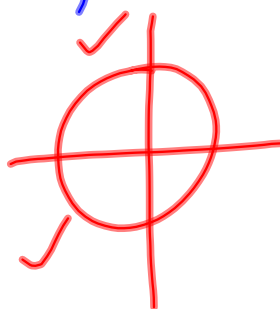$$x = \begin{cases} 0.43 + 8k, k \in I \\ 3.57 + 8k, k \in I \end{cases}$$

2nd answer:
$\pi - 0.34$

$sin3x = 1, 0 \le x < 2\pi$

$$cos\left[4(x - \frac{\pi}{2})\right] = -\frac{\sqrt{3}}{2}$$ (exact values)

$$4(x - \frac{\pi}{2}) = cos^{-1}\left(\frac{-\sqrt{3}}{2}\right)$$

$$4(x - \frac{\pi}{2}) = \begin{cases} \frac{5\pi}{6} + 2\pi k, k \in I \\ \frac{7\pi}{6} + 2\pi K, K \in I \end{cases}$$

$$x - \frac{\pi}{2} = \begin{cases} \frac{5\pi}{24} + \frac{\pi}{2} k, K \in I \\ \frac{7\pi}{24} + \frac{\pi}{2} K, K \in I \end{cases}$$

$$x = \begin{cases} \frac{17\pi}{24} + \frac{\pi}{2} n, n \in I \\ \frac{19\pi}{24} + \frac{\pi}{2} n, n \in I \end{cases}$$

Pg 275 - #2,3,4,5