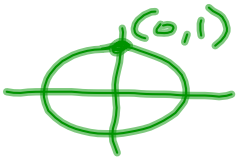
Solving Trig Equations using Sum & Difference Identities Notes

Ex.1 - Solve:

$$\cos\left(\frac{\pi}{2}+x\right)=\frac{\sqrt{2}}{2}$$

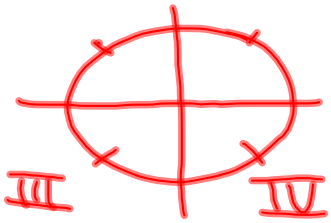


$\left(\cos\frac{\pi}{2}\right)\cos x-\left(\sin\frac{\pi}{2}\right)\sin x=\frac{\sqrt{2}}{2}$

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

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

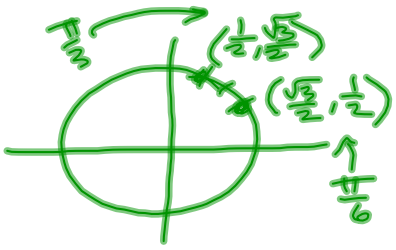
① expand
② Substitute & Simplify
③ Solve



$x=\frac{5\pi}{4},\frac{7\pi}{4}$

Ex.2 - Solve:

$$\cos\left(\frac{\pi}{6}+x\right)+\sin\left(\frac{\pi}{3}+x\right)=0$$



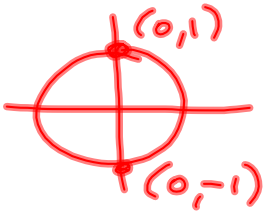
$\left(\cos\frac{\pi}{6}\right)\cos x-\left(\sin\frac{\pi}{6}\right)\sin x+\left(\sin\frac{\pi}{3}\right)\cos x+\left(\cos\frac{\pi}{3}\right)\sin x=0$

$\frac{\sqrt{3}}{2}\cos x-\frac{1}{2}\sin x+\frac{\sqrt{3}}{2}\cos x+\frac{1}{2}\sin x=0$

$2\left(\frac{\sqrt{3}}{2}\cos x\right)=0$

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

$\cos x=0$



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

Ex.3 - Solve:

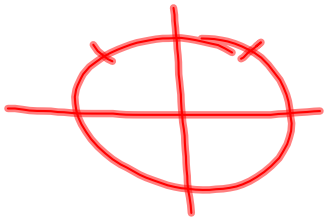
$$\sin(\pi - x) = \sqrt{2} - \sin x$$

$(\sin\pi \cdot \cos x) - (\cos\pi)\sin x = \sqrt{2} - \sin x$

$-(-1)\cdot\sin x$

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

$+\sin x \quad +\sin x$



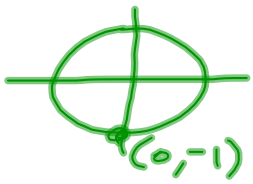
$2\sin x = \sqrt{2}$

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

$x = \frac{\pi}{4}, \frac{3\pi}{4}$

Ex.4 - Solve:

$$\cos\left(x + \frac{3\pi}{2}\right) = 2\sin^2 x - 3$$



$\cos x \cdot \left(\cos\frac{3\pi}{2}\right) - \sin x \cdot \left(\sin\frac{3\pi}{2}\right) = 2\sin^2 x - 3$

-1

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

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

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

$\sin x = \frac{3}{2}$ N/A

$\sin x = -1$

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