

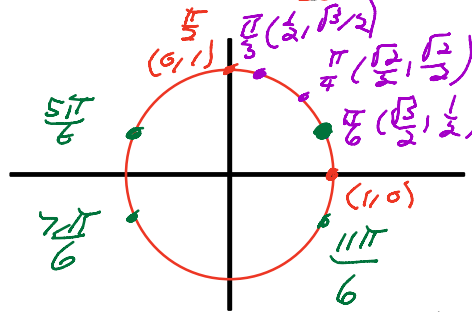
$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$3. \quad 3 \tan^2 \theta - 1 = 0$$

$$3 \tan^2 \theta = 1$$

$$\tan^2 \theta = \frac{1}{3}$$

$$\tan \theta = \pm \frac{1}{\sqrt{3}} = \pm \frac{\sqrt{3}}{3}$$



$$\tan \theta = 0 \Rightarrow \theta = 0$$

$$\tan \frac{\pi}{6} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$$

$$\theta = k\pi \pm \frac{\pi}{6}$$

$$\theta = \frac{\pi(2k+1)}{2} \pm \frac{\pi}{6}$$

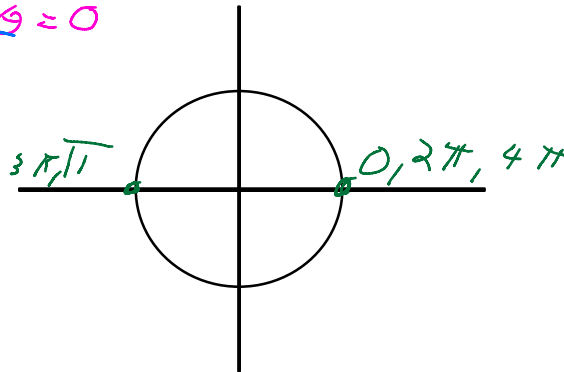
$$4. \quad \sin^2 \theta - \cos^2 \theta + 1 = 0$$

$$\sin^2 \theta - \cos^2 \theta + \sin^2 \theta + \cos^2 \theta = 0$$

$$2\sin^2 \theta = 0$$

$$\sin \theta = 0$$

$$\theta = 0, \pi, 2\pi, 3\pi, 4\pi$$



$$d = \pi$$

$$a_n = a_1 + d(n-1)$$

$$\theta = 0 + \pi(n-1)$$

$$\theta = \pi n + \pi$$

$$\theta = \pi n$$

$$\begin{aligned} \cos 2\theta &= \cos^2 \theta - \sin^2 \theta \\ &= 2\cos^2 \theta - 1 \\ &= 1 - 2\sin^2 \theta \end{aligned}$$

$$\sin 2\theta = 2\sin \theta \cos \theta$$

$$2 \sin \theta \cos \theta = \frac{1}{2}$$

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

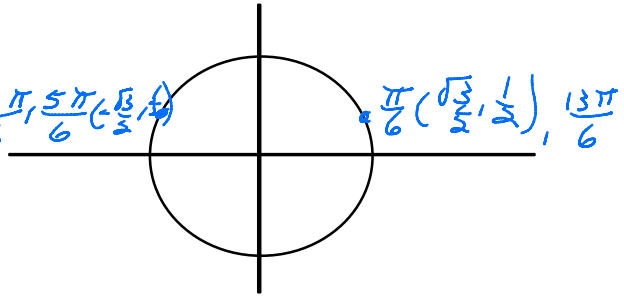
go around 2 times

$$2\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}$$

$$\theta = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}$$

$$\frac{17\pi}{6}, \frac{5\pi}{6} \left(-\frac{\sqrt{3}}{2}, \frac{1}{2}\right)$$

$$\frac{\pi}{6} \left(\frac{\sqrt{3}}{2}, \frac{1}{2}\right), \frac{13\pi}{6}$$



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

go around circle 5 times