

4.4 Solving Trig Equations with Factoring

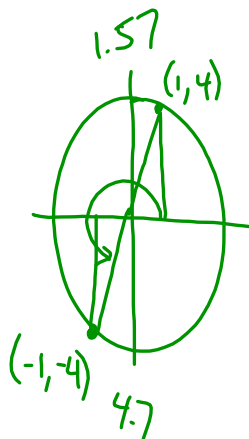
Ex) Solve $\tan^2 \theta - 5 \tan \theta + 4 = 0$, $\theta \in [0, 2\pi)$

let $x = \tan \theta$ $x^2 - 5x + 4 = 0$

$$(x - 4)(x - 1) = 0$$

$$x = 4 \quad x = 1$$

$$\rightarrow \tan \theta = 4 \quad \tan \theta = 1$$



$$\theta = \begin{cases} 1.3 & \text{QI} \\ +\pi & \\ 4.5 & \text{QIII} \end{cases} \quad \theta = \begin{cases} \pi/4 & \text{QI} \\ 5\pi/4 & \text{QIII} \end{cases}$$

Ex) Solve $\sin^2 x - 1 = 0$, $x \in [0, 2\pi)$

$$\sin^2 x = 1$$

$$\sin x = \pm \sqrt{1} \quad (\sin x + 1)(\sin x - 1) = 0$$

$$\sin x = 1 \quad \sin x = -1 \quad \sin x + 1 = 0 \quad \sin x - 1 = 0$$

$$x = \pi/2$$

$$x = 3\pi/2$$

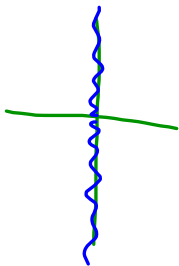
$$\sin x = -1 \quad \sin x = 1$$

Now find all x that satisfy the equation...

$$x = \begin{cases} \pi/2 + 2\pi n, n \in \mathbb{Z} \\ 3\pi/2 + 2\pi n, n \in \mathbb{Z} \end{cases}$$



$$x = \pi/2 + \pi n, n \in \mathbb{Z}$$



Ex) Solve $\cos^2 x - \cos x = 0$ for all x ,
in degrees.

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

$$\cos x = 0 \quad \cos x = 1$$

$$x = \begin{cases} 90^\circ + 360^\circ n, n \in \mathbb{Z} \\ 270^\circ + 360^\circ n, n \in \mathbb{Z} \end{cases}$$

$$\downarrow$$

$$x = 90^\circ + 180^\circ n, n \in \mathbb{Z}$$

$$x = 360^\circ n, n \in \mathbb{Z}$$

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#2, 3, 7-9, 13, 16, 21, C1, C4