

Solving Trig Equations

Difference between an expression & equation (=)

ex: $2 \sin \theta - 1 = 0$

similar to

$$\begin{array}{l} 2x - 1 = 0 \\ \underline{+1} \quad \underline{+1} \end{array}$$

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

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

isolate

$$\begin{array}{l} 2 \sin \theta - 1 = 0 \\ \underline{+1} \quad \underline{+1} \end{array}$$

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

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

find θ 180 -

$$\theta = \begin{array}{cc} \text{I} & \text{II} \\ 30^\circ & 150^\circ \end{array}$$

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

$(-, +)$ S^+ sin	A^+ all $(+, +)$
$(-, -)$ T^+ tan	C^+ cos $(+, -)$

Ex 2: $\sin x \frac{\cos x}{\sin x} = \frac{-\sqrt{3}}{2}$

Ref L

$$\cos x = \frac{-\sqrt{3}}{2}$$

$$\cos^{-1}\left(\frac{\sqrt{3}}{2}\right) = 30^\circ$$

$$x = \begin{array}{cc} 180 - & 180 + \\ \text{II} & \text{III} \\ 150^\circ & 210^\circ \end{array}$$

Ex 3: $\cos \theta \cot \theta - \cos \theta = 0$

$$\cos \theta (\cot \theta - 1) = 0$$

$$\cos \theta = 0$$

$$\cot \theta - 1 = 0$$

$$\boxed{\theta = 90^\circ, 270^\circ}$$

$$\cot \theta = 1$$

$$\tan \theta = 1 \quad \tan^{-1}(1)$$

$$\boxed{\begin{array}{cc} \text{I} & \text{III} \\ \theta = 45^\circ & 225^\circ \end{array}}$$

ex 4: $4 \cos^2 x - 3 = 0$

$$4 \cos^2 x = 3$$

$$\sqrt{\cos^2 x} = \sqrt{\frac{3}{4}} = \frac{\sqrt{3}}{2}$$

$$\cos x = \pm \frac{\sqrt{3}}{2}$$

I II III IV

$$\theta = 30^\circ \quad 150^\circ \quad 210^\circ \quad 330^\circ$$

ex: 5 $(\csc - 2)(3 \tan^2 - 1) = 0$

$\csc - 2 = 0$

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

$\theta = 30^\circ \quad 150^\circ$

$3 \tan^2 - 1 = 0$

$\sqrt{\tan^2} = \sqrt{\frac{1}{3}}$
 $\tan = \pm \frac{\sqrt{1}}{\sqrt{3}}$

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

$\theta = 30^\circ \quad 150^\circ \quad 210^\circ \quad 330^\circ$

ex: $\cos^2 \theta - 3 \cos \theta + 2 = 0$

$x^2 - 3x + 2$

$(x - 2)(x - 1)$

$\cos x - 2 = 0$

$\cos x = 2$

not possible

$\cos x - 1 = 0$

$\cos x = 1$

$x = 0^\circ / 360^\circ$

ex: $3 \sin \theta - 2 = \sin \theta$
 $-\sin \theta \quad -\sin \theta$

$2 \sin \theta - 2 = 0$

$2 \sin \theta = 2$

$\sin \theta = 1 \quad \theta = 90^\circ$

ex:

$\sec^2 - 4 \sec + 4 = 0$

$(\sec - 2)(\sec - 2)$

$\sec - 2 = 0$

$\sec = 2$

$\cos \theta = \frac{1}{2}$ $\text{I} \quad \text{IV}$
 $60^\circ \quad 300^\circ$

$x^2 - 4x + 4$
 $(x - 2)(x - 2)$

$\cos \theta = \frac{1}{2}$ $\text{II} \quad \text{III}$
 $120^\circ \quad 240^\circ$

$\cos^{-1}(\frac{1}{2}) = 60^\circ$

$\sin / \cos / \tan = 2$

$\cos \theta = 2$ not possible