6.4 Solving Trig Equations Using Identities – part 1

Non-Permissible Values: Values of the variable that make the function undefined.

$\frac{2x}{x+3}$ Denominator $\neq 0$ n.p.v. $x+3 \neq 0$

$x \neq -3$

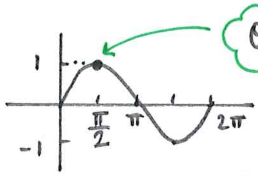
Example 1: Determine any non-permissible values for $0 \le \theta < 2\pi$

a) $\frac{\cos\theta}{1-\sin\theta}$

n.p.v. $1 - \sin\theta \neq 0$

$1 \neq \sin\theta$

$\theta \neq \frac{\pi}{2}$ if $0 \le \theta < 2\pi$



$y = \sin\theta$

$\theta \neq \frac{\pi}{2} + 2\pi n, n \in I$
(if no interval)

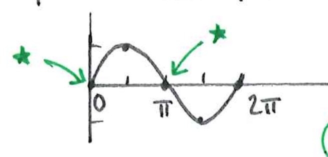
b) $3\cot\theta$

$\frac{3\cos\theta}{\sin\theta}$

$\cot\theta$ has asymptotes when $\sin\theta = 0$

So... $\cot\theta$ is undefined when $\sin\theta = 0$

n.p.v. $\sin\theta \neq 0$



$\theta \neq 0, \pi$ if $0 \le \theta < 2\pi$

$\theta \neq \pi n, n \in I$
(if no interval)

Example 2: Solve $\cos 2\theta + 1 - \cos\theta = 0$ over the domain $0 \le \theta < 2\pi$. Express your answer as exact values.

① Use an identity to make all the angles the same.

$$2\cos^2\theta \cancel{-1} \cancel{+1} - \cos\theta = 0$$

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

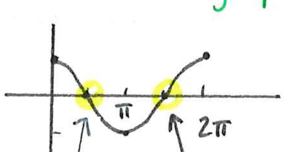
② Factor out a common term and solve.

$$\cos\theta(2\cos\theta - 1) = 0$$

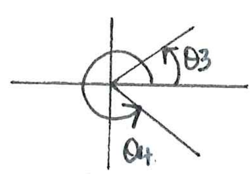
$\cos\theta = 0$
use cos graph

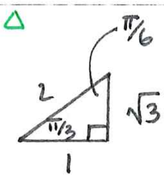
$2\cos\theta - 1 = 0$

$\cos\theta = \frac{1}{2}$ use special Δ



$\theta_1 = \frac{\pi}{2}$ $\theta_2 = \frac{3\pi}{2}$





$\theta_3 = \theta_R = \frac{\pi}{3}$ $\theta_3 = \frac{\pi}{3}$

$\theta_4 = 2\pi - \theta_R$
$= 2\pi - \frac{\pi}{3}$

$\theta_4 = \frac{5\pi}{3}$