

# *Trig Equations*

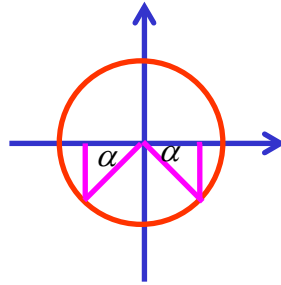
e.g. (i)  $2\sin x = -\sqrt{3}$  , where  $0 \leq x \leq 2\pi$

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

Q3, Q4

$$\sin \alpha = \frac{\sqrt{3}}{2}$$

$$\alpha = \frac{\pi}{3}$$



$$x = \pi + \alpha , 2\pi - \alpha$$

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

$$x = \frac{4\pi}{3} , \frac{5\pi}{3}$$

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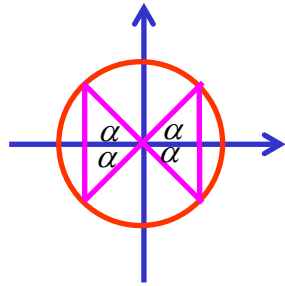
$$(ii) \tan^2 x = 3, \quad \text{where } 0 \leq x \leq 2\pi$$

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

Q1, Q2, Q3, Q4

$$\tan \alpha = \sqrt{3}$$

$$\alpha = \frac{\pi}{3}$$



$$x = \alpha, \pi - \alpha, \pi + \alpha, 2\pi - \alpha$$

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

$$x = \frac{\pi}{3}, \frac{2\pi}{3}, \frac{4\pi}{3}, \frac{5\pi}{3}$$


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$$(iii) \cos^2 x + \cos x = 2, \quad \text{where } x \leq x \leq 2\pi$$

$$\cos^2 x + \cos x - 2 = 0$$

$$(\cos x + 2)(\cos x - 1) = 0$$

$$\cos x = -2 \quad \text{or} \quad \cos x = 1$$

no solutions  $x = 0$  or  $2\pi$

$$\therefore x = 0 \text{ or } 2\pi$$


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$$(iv) 4\sec^2 x = 3\tan x + 5 \quad , \quad \text{where } 0 \leq x \leq 2\pi$$

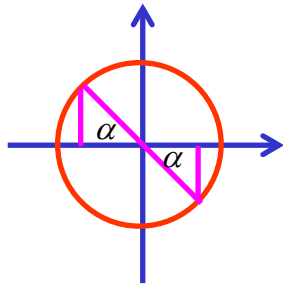
$$4 + 4\tan^2 x = 3\tan x + 5$$

$$4\tan^2 x - 3\tan x - 1 = 0$$

$$(4\tan x + 1)(\tan x - 1) = 0$$

$$\tan x = -\frac{1}{4}$$

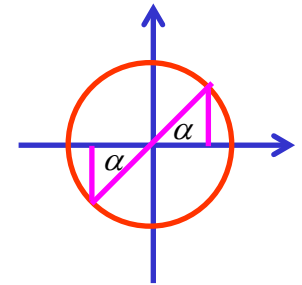
Q2, Q4



or

$$\tan x = 1$$

Q1, Q3



$$\tan \alpha = \frac{1}{4}$$

$$\alpha = 0.245$$

$$x = \pi - \alpha, 2\pi - \alpha$$

$$x = \pi - 0.245, 2\pi - 0.245$$

$$x = 2.897, 6.038$$

$$\tan \alpha = 1$$

$$\alpha = \frac{\pi}{4}$$

$$x = \alpha, \pi + \alpha$$

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

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

$$x = \frac{\pi}{4}, 2.897, \frac{5\pi}{4}, 6.038$$

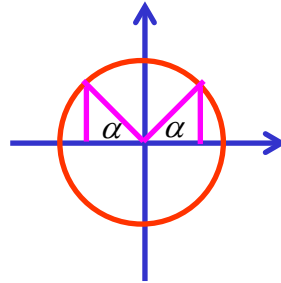
$$(v) \sin 2x = \frac{1}{\sqrt{2}}, \quad \text{where } 0 \leq x \leq 2\pi$$

$$0 \leq 2x \leq 4\pi$$

Q1, Q2

$$\sin \alpha = \frac{1}{\sqrt{2}}$$

$$\alpha = \frac{\pi}{4}$$



$$2x = \alpha, \pi - \alpha$$

$$2x = \frac{\pi}{4}, \pi - \frac{\pi}{4}$$

$$2x = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{9\pi}{4}, \frac{11\pi}{4}$$

$$x = \frac{\pi}{8}, \frac{3\pi}{8}, \frac{9\pi}{8}, \frac{11\pi}{8}$$

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**Exercise 11H; 1d, 2b, 3h, 4c, 7dg, 8bc, 9a, 11bce, 12, 13**