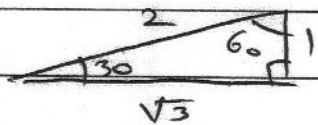


#5) $2 \sin^2 \theta - \sin \theta - 1 = 0$; $0 \leq \theta < 2\pi$
 $(2 \sin \theta + 1)(\sin \theta - 1) = 0$

$$2 \sin \theta + 1 = 0$$

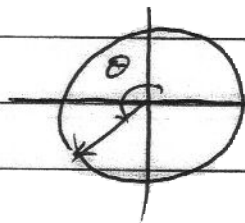
$$2 \sin \theta = -1$$

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



θ is in QIII or QIV

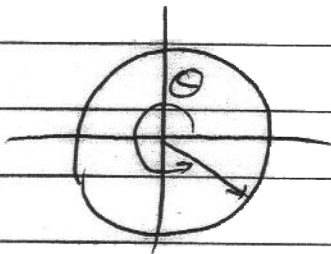
QIII



$$\theta - \pi = \pi/6$$

$$\theta = \pi + \frac{\pi}{6} = \frac{7\pi}{6}$$

QIV



$$2\pi - \theta = \pi/6$$

$$\theta = 2\pi - \frac{\pi}{6} = \frac{11\pi}{6}$$

\therefore Sol. set $\theta = \left\{ \frac{\pi}{2}, \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$

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#10) $\cos^2 \theta - \sin^2 \theta + \sin \theta = 0, \quad 0 \leq \theta < 2\pi$

$\Rightarrow 1 - 2\sin^2 \theta + \sin \theta = 0$

$-2\sin^2 \theta + \sin \theta + 1 = 0$

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

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

$-2\sin \theta = 1$

$\sin \theta = -1/2$

$\sin \theta - 1 = 0$

$\sin \theta = 1$

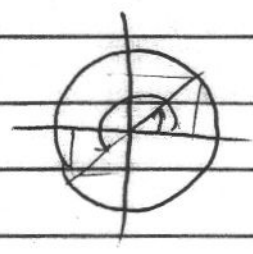
$\theta = \pi/2$

this is exactly like # 5)

Sol. Let $\theta = \left\{ \pi/2, 7\pi/6, 11\pi/6 \right\}$.

#15) $\cos \theta = \sin \theta$

$\Rightarrow \theta = \pi/4, \pi/4 + \pi$



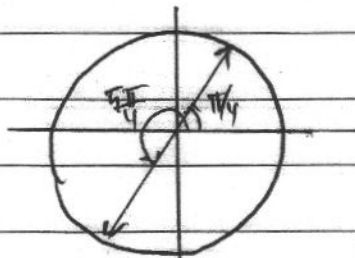
$\theta = \left\{ \pi/4, 5\pi/4 \right\}$

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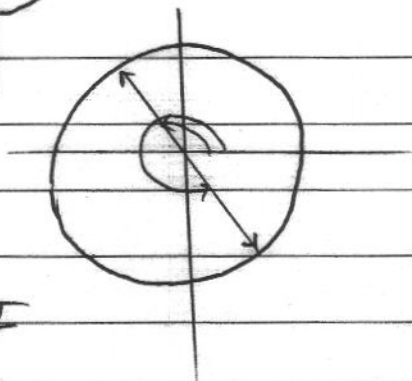
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#20)

$$\tan \theta = \cot \theta \Rightarrow \theta = \pi/4, 5\pi/4$$



ALSO



$$\theta = \frac{3\pi}{4}, \frac{3\pi}{4} + \pi = \frac{7\pi}{4}$$

$$\therefore \text{Sol. set } \theta = \left\{ \frac{\pi}{4}, \frac{5\pi}{4}, \frac{3\pi}{4}, \frac{7\pi}{4} \right\}$$

#25)

$$\cos(4\theta) - \cos(6\theta) = 0$$

Use identity (9) on page 637

$$\cos \alpha - \cos \beta = -2 \sin \left(\frac{\alpha + \beta}{2} \right) \sin \left(\frac{\alpha - \beta}{2} \right)$$

$$\cos 4\theta - \cos 6\theta = -2 \sin 5\theta \sin(-\theta) = 0$$

$$\Rightarrow \sin 5\theta = 0 \Rightarrow 5\theta = 0 + k\pi, k = 0, 1, 2, 3, \dots$$

$$\theta = \frac{k\pi}{5}$$

$$\sin(-\theta) = -\sin \theta = 0$$

$$\Rightarrow \sin \theta = 0 \Rightarrow \theta = 0 + k\pi, k = 0, 1, 2, 3, \dots$$

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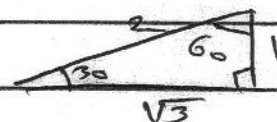
Continue # 25

$$\theta = \frac{k\pi}{5}, k\pi; k=0,1,2,3, \dots$$

$$\text{But } 0 \leq \theta < 2\pi$$

$$\rightarrow \text{Sol. set } \theta = \left\{ 0, \frac{\pi}{5}, \pi, \frac{2\pi}{5}, \frac{3\pi}{5}, \frac{4\pi}{5}, \frac{6\pi}{5}, \frac{7\pi}{5}, \frac{8\pi}{5}, \frac{9\pi}{5} \right\}$$

#30) $2\cos^2\theta - 7\cos\theta - 4 = 0$
 $(2\cos\theta + 1)(\cos\theta - 4) = 0$



$$2\cos\theta + 1 = 0$$

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

$\theta \in \text{QII or QIII}$

QII



$$\pi - \theta = \pi/3$$

$$\theta = \pi - \pi/3 = 2\pi/3$$

QIII



$$\theta - \pi = \pi/3$$

$$\theta = \pi + \pi/3 = 4\pi/3$$

$$\cos\theta - 4 = 0$$

$$\cos\theta = 4 \quad \text{Q: it be}$$

$$\text{because } -1 \leq \cos\theta \leq 1$$

\therefore Sol. set is

$$\theta = \left\{ 2\pi/3, 4\pi/3 \right\}$$

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#35

$$3 - \sin \theta = \cos 2\theta$$

But $\cos 2\theta = 1 - 2\sin^2 \theta$

$$\Rightarrow 3 - \sin \theta = 1 - 2\sin^2 \theta$$

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

$(2\sin \theta) (\sin \theta)$ can't be factored.

The equation is quadratic in $\sin \theta$

let $x = \sin \theta \Rightarrow x^2 = \sin^2 \theta$

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

$a=2, b=-1, c=2$

$$b^2 - 4ac = (-1)^2 - 4(2)(2) = 1 - 16 = -15 < 0$$

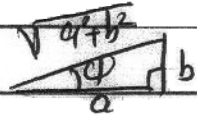
\Rightarrow The equation has NO REAL SOLUTIONS.

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#40) $\sqrt{3} \sin \theta + \cos \theta = 1$

Use Reduction Identity Page (650)

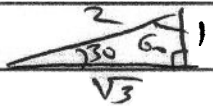
$a \sin \theta + b \cos \theta = \sqrt{a^2+b^2} \sin(\theta + \phi)$, 

where $\cos \phi = \frac{a}{\sqrt{a^2+b^2}}$, $\sin \phi = \frac{b}{\sqrt{a^2+b^2}}$

So $\sqrt{3} \sin \theta + \cos \theta = 1$

Here $a = \sqrt{3}$, $b = 1$; $\sqrt{a^2+b^2} = \sqrt{3+1} = 2$.

$\Rightarrow \sqrt{3} \sin \theta + \cos \theta = 2 \sin(\theta + \phi) = 1$

$\cos \phi = \frac{\sqrt{3}}{2}$, $\sin \phi = \frac{1}{2}$ 

$\Rightarrow \phi = \pi/6$

$\Rightarrow 2 \sin(\theta + \pi/6) = 1$

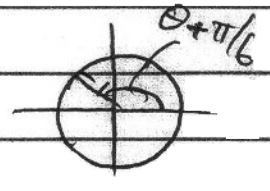
$\sin(\theta + \pi/6) = 1/2$

Q I

$\theta + \pi/6 = \pi/6$
 $\Rightarrow \theta = 0$

Q II

$\pi - (\theta + \pi/6) = \pi/6$
 $\pi - \theta - \pi/6 = \pi/6$



$\theta = \pi - \frac{2\pi}{6} = \frac{4\pi}{6} = \frac{2\pi}{3}$

\therefore sol set $\theta = \{0, 2\pi/3\}$