

Solving Trig Equations H.W.

s	A
r	c

2 a) $\sin \theta = 0.2671$

$$\theta = 0.27$$

and $\theta = \pi - 0.27$
 $= 2.87$

b) $\cos \theta = 0.8923$

$$\theta = 0.47$$
$$\theta = 2\pi - 0.47$$
$$= 5.81$$

c) $\tan \theta = 0.324$

$$\theta = 0.31$$
$$\theta = \pi + 0.31$$
$$= 3.45$$

d) $\sec \theta = 1.167$

$$\frac{1}{\cos \theta} = 1.167$$
$$\cos \theta = 0.8568980291$$
$$\theta = 0.54$$
$$\theta = 2\pi - 0.54$$
$$= 5.74$$

e) $\csc \theta = 8.487$

$$\frac{1}{\sin \theta} = 8.487$$
$$\sin \theta = 0.1178272652$$
$$\theta = 0.12$$
$$\theta = \pi - 0.12$$
$$\theta = 3.02$$

f) $\cot \theta = 9.34$

$$\frac{1}{\tan \theta} = 9.34$$
$$\tan \theta = 0.1070663812$$
$$\theta = 0.11$$
$$\theta = \pi + 0.11$$
$$\theta = 3.25$$

g) $\cos \theta = 0.44$

$$\theta = 1.12$$
$$\theta = 2\pi - 1.12$$
$$= 5.16$$

h) $\sin \theta = 0.6405$

$$\theta = 0.75$$
$$\theta = \pi - 0.75$$
$$\theta = 2.39$$

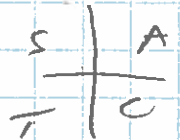
i) $\tan \theta = 2.671$

$$\theta = 1.21$$
$$\theta = \pi + 1.21$$
$$= 4.35$$

j) $\cos \theta = -0.1067$

$$\theta = 1.68$$
$$\theta = 2\pi - 1.68$$
$$= 4.60$$

TRIG EQUATIONS H.W.



1E2 continued.

2k) $\sin \theta = -0.804$

$\theta = -0.93$

$\theta = 2\pi - 0.93$
 $= 5.35$

← sine -ve in
 Quad 4

OR $\theta = \pi + 0.93$
 $= 4.07$

← quad 3

2L) $6\cos \theta + 1 = 0$

$\cos \theta = -\frac{1}{6}$

$\theta = 1.74$

← quad 2

ref angle: $\pi - 1.74$
 $= 1.40$

and

$\theta = \pi + 1.40$
 $= 4.54$

2m) $3\sin \theta + 1 = 2$

$3\sin \theta = 1$

$\sin \theta = \frac{1}{3}$

$\theta = 0.34$

and $\pi - 0.34$

$\theta = 2.80$

2h) $2\cos^2 \theta + 3\cos \theta - 1 = 0$

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

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

$\theta = 1.05$

and $\theta = 2\pi - 1.05$

$= 5.23$

→ $\cos \theta = -2$
 NOT possible

TRIG Equation

$$\frac{s}{r} = \frac{A}{c}$$

2p) $6\sin^2\theta + 5\sin\theta - 6 = 0$

$$(2\sin\theta + 3)(3\sin\theta - 2) = 0$$

↓

$$\sin\theta = -\frac{3}{2}$$

$\theta =$ NO ANSWER

$$\sin\theta = \frac{2}{3}$$

$$\theta = 0.73$$

$$\theta = \pi - 0.73$$

$$= 2.41$$

2q) $4\cos^2\theta + 5\cos\theta - 6 = 0$

$$(\cos\theta + 2)(4\cos\theta - 3) = 0$$

↓

$$\cos\theta = -2$$

no solution

↓

$$\cos\theta = \frac{3}{4}$$

$$\theta = 0.72$$

$$\theta = 2\pi - 0.72$$

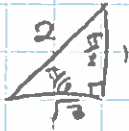
$$= 5.56$$

TRIG EQUATIONS h.w.

S	A
-	C

$0 \leq \theta \leq 2\pi$

3 a) $\cos \theta = \frac{\sqrt{3}}{2}$



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

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

b) $\sin \theta = -\frac{1}{\sqrt{2}}$

Ref angle = $\frac{\pi}{4}$

but sign neg in $\frac{III}{IV} \rightarrow \theta = \pi + \frac{\pi}{4} = \frac{5\pi}{4}$

$\frac{IV}{I} \rightarrow \theta = 2\pi - \frac{\pi}{4} = \frac{7\pi}{4}$

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

Ref angle = $\frac{\pi}{6}$

and $\theta = \pi - \frac{\pi}{6} = \frac{5\pi}{6}$

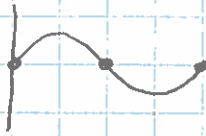
d) $\tan \theta = 1$

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

and $\theta = \pi + \frac{\pi}{4} = \frac{5\pi}{4}$

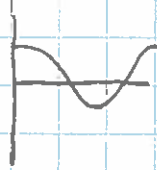
e) $\sin \theta = 0$

$\theta = 0, \pi, 2\pi$



f) $\cos \theta = -1$

$\theta = \pi$



g) $\sec \theta = 1$

so $\frac{1}{\cos \theta} = 1$

$\cos \theta = 1$

$\theta = 0, 2\pi$

h) $\cot \theta = 0$

so $\frac{\cos \theta}{\sin \theta} = 0$

$\cos \theta = 0$ when $\theta = \frac{\pi}{2}, \frac{3\pi}{2}$

TRIG EQUATIONS



4) $0 \leq \theta \leq 2\pi$

a) $2 \cos \theta = 1$
 $\cos \theta = \frac{1}{2}$

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

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

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

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

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

ref angle $\theta = \frac{\pi}{6}$

sin neg in III

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

IV

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

c) $3 \cos \theta + 4 = 0$

$3 \cos \theta = -4$

$\cos \theta = -\frac{4}{3}$

No solution (cos must be between -1 and 1)

d) $\tan \theta + \sqrt{3} = 0$

$\tan \theta = -\sqrt{3}$

ref angle $\theta = \frac{\pi}{3}$

tan neg in II

$\theta = \pi - \frac{\pi}{3}$

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

IV $\theta = 2\pi - \frac{\pi}{3}$

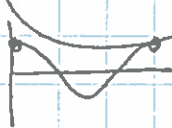
$\theta = \frac{5\pi}{3}$

e) $\cos \theta + 2 = 3 \cos \theta$

$2 = 2 \cos \theta$

$1 = \cos \theta$

$\theta = 0, 2\pi$



f) $\tan \theta - 1 = 0$

$\tan \theta = 1$

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

and $\theta = \pi + \frac{\pi}{4}$

$\theta = \frac{5\pi}{4}$

TRIG EQUATIONS

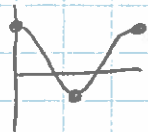


$$\frac{s}{A} = \frac{1}{2}$$

5) $0 \leq \theta < 2\pi$

a) $2\cos^2\theta = 2$
 $\cos^2\theta = 1$
 $\cos\theta = \pm 1$

$\theta = 0, 2\pi, \pi$



b) $\sin^2\theta = \frac{3}{4}$

$\sin\theta = \pm \frac{\sqrt{3}}{2}$

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

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

$\theta = \pi - \frac{\pi}{3}$

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

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

$\theta = \pi + \frac{\pi}{3}$

$= \frac{4\pi}{3}$

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

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

c) $4\sin^2\theta - 1 = 0$

$\sin^2\theta = \frac{1}{4}$

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

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

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

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

$= \frac{5\pi}{6}$

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

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

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

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

$= \frac{11\pi}{6}$

d) $4\cos^2\theta - 3 = 0$

$4\cos^2\theta = 3$

$\cos^2\theta = \frac{3}{4}$

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

$\cos\theta = \frac{\sqrt{3}}{2}$

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

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

$= \frac{11\pi}{6}$

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

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

$= \frac{5\pi}{6}$

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

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

5e) $\cos^2\theta - 1 = 0$

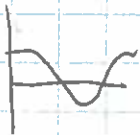
$\cos^2\theta = 1$

$\cos\theta = \pm 1$

$\cos\theta = 1$

$\cos\theta = -1$

$\theta = 0, 2\pi$



$\theta = \pi$

5f) $\cos^2\theta = \frac{1}{4}$

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

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

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

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

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

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

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

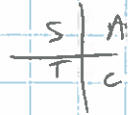
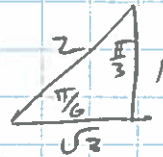
$\theta = \pi - \frac{\pi}{3}$

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

$\theta = \pi + \frac{\pi}{3}$

$= \frac{4\pi}{3}$

TRIG EQUATIONS



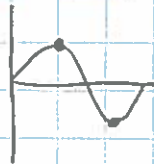
5g) $\sin^2 \theta - 1 = 0$

$\sin^2 \theta = 1$

$\sin \theta = \pm 1$

$\sin \theta = 1$

$\theta = \frac{\pi}{2}$



$\sin \theta = -1$

$\theta = \frac{3\pi}{2}$

h) $4\sin^2 \theta - 3 = 0$

$\sin^2 \theta = \frac{3}{4}$

$\sin \theta = \pm \frac{\sqrt{3}}{2}$

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

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

$\theta = \frac{2\pi}{3}$

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

$\theta = \frac{4\pi}{3}$

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

5i) $4\cos^2 \theta - 1 = 0$

$\cos^2 \theta = \frac{1}{4}$

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

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

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

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

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

$\theta = \frac{2\pi}{3}$

$\theta = \frac{4\pi}{3}$

5j) $\tan^2 \theta + \tan \theta = 0$

$-\tan \theta (\tan \theta + 1) = 0$

$\tan \theta = 0$

$\frac{\sin \theta}{\cos \theta} = 0$

$\sin \theta = 0$

$\theta = 0, \pi, 2\pi$

$\tan \theta + 1 = 0$
 $\tan \theta = -1$

MF angle
 $\tan \theta = 1$

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

(tan neg)

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

$\theta = \frac{7\pi}{4}$

5k) $\sin^2 \theta + \sin \theta = 0$

$\sin \theta (\sin \theta + 1) = 0$

$\sin \theta = 0$

$\theta = 0, \pi, 2\pi$

$\sin \theta = -1$

$\theta = \frac{3\pi}{2}$

5l) $\cos^2 \theta - \cos \theta = 0$

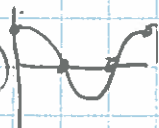
$\cos \theta (\cos \theta - 1) = 0$

$\cos \theta = 0$

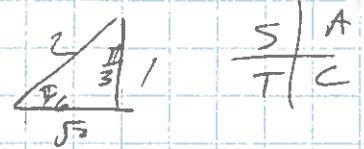
$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$

$\cos \theta = 1$

$\theta = 0, 2\pi$



TRIG EQUATIONS



5m) $\sin^2 \theta + 2\sin \theta - 3 = 0$

$$(\sin \theta + 3)(\sin \theta - 1) = 0$$

$\left\{ \begin{array}{l} \sin \theta = -3 \\ \text{None} \end{array} \right.$
 $\rightarrow \sin \theta = 1$
 $\theta = \pi/2$

5n) $2\sin^2 \theta - 3\sin \theta + 1 = 0$

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

$\left\{ \begin{array}{l} \sin \theta = 1/2 \\ \sin \theta = 1 \end{array} \right.$
 $\theta = \pi/2$

5o) $\cos^2 \theta - 2\cos \theta - 3 = 0$

$$(\cos \theta - 3)(\cos \theta + 1) = 0$$

$\left\{ \begin{array}{l} \cos \theta = 3 \\ \text{No solution} \end{array} \right.$
 $\rightarrow \cos \theta = -1$
 $\theta = \pi$

p) $2\cos^2 \theta + (2 - \sqrt{3})\cos \theta - \sqrt{3} = 0$

$$(2\cos \theta - \sqrt{3})(\cos \theta + 1) = 0$$

$\left\{ \begin{array}{l} \cos \theta = \sqrt{3}/2 \\ \cos \theta = -1 \end{array} \right.$
 $\theta = \pi/6$
 $\theta = 11\pi/6$
 $\theta = \pi$

5q) $2\sin^2 \theta + \sin \theta = 0$

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

$\left\{ \begin{array}{l} \sin \theta = 0 \\ \sin \theta = -1/2 \end{array} \right.$
 $\theta = 0, \pi, 2\pi$
 left angle is $\pi/6$

$\theta = 7\pi/6$
 $\theta = 11\pi/6$

5r) $2\sin^2 \theta + \sin \theta - 1 = 0$

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

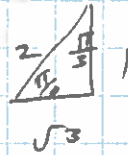
$\left\{ \begin{array}{l} \sin \theta = 1/2 \\ \sin \theta = -1 \end{array} \right.$
 $\theta = \pi/6$
 $\theta = 5\pi/6$
 $\theta = 3\pi/2$

5s) $\sin^2 \theta + 5\sin \theta + 6 = 0$

$$(\sin \theta + 3)(\sin \theta + 2) = 0$$

$\left\{ \begin{array}{l} \sin \theta = -3 \\ \sin \theta = -2 \end{array} \right.$
 NO SOLUTION

TRIG EQUATIONS



$$5c) \quad 2 \sec^2 \theta - 3 \sec \theta - 2 = 0$$

$$\frac{2}{\cos^2 \theta} - \frac{3}{\cos \theta} - 2 = 0$$

$$2 - 3 \cos \theta - 2 \cos^2 \theta = 0$$

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

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

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

$$\theta = \pi/3$$

$$\theta = 5\pi/3$$

$$\cos \theta = -2$$

No solution

$$5u) \quad 2 \cos^2 \theta + \cos \theta = 0$$

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

$$\cos \theta = 0 \quad \cos \theta = -\frac{1}{2}$$

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

Reference is

$$\theta = \pi/3$$

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

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

$$5v) \quad \sin^2 \theta - 2 \sin \theta - 3 = 0$$

$$(\sin \theta - 3)(\sin \theta + 1) = 0$$

$$\sin \theta = 3 \quad \sin \theta = -1$$

No solution

$$\theta = \frac{3\pi}{2}$$

$$5w) \quad \cos^2 \theta - 3 \cos \theta - 4 = 0$$

$$(\cos \theta - 4)(\cos \theta + 1) = 0$$

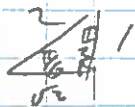
$$\cos \theta = 4$$

No solution

$$\cos \theta = -1$$

$$\theta = \pi$$

TRIG EQUATIONS



S/A
T/C

16 a) $\cos^3 \theta + 2\cos^2 \theta - \cos \theta - 2 = 0$

\rightarrow think $x^3 + 2x^2 - x - 2 = 0$

$(\cos \theta - 1)(\cos^2 \theta + 3\cos \theta + 2) = 0$

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

\swarrow
 $\cos \theta = 1$

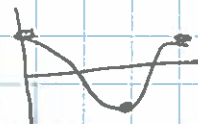
\downarrow
 $\cos \theta = -2$

\rightarrow
 $\cos \theta = -1$

1	2	-1	-2
	1	3	0
1	3	2	

$\theta = 0, 2\pi$

$\theta = \pi$



b) $2\cos^3 \theta + 7\cos^2 \theta + 2\cos \theta - 3 = 0$

$(\cos \theta + 1)(2\cos^2 \theta + 5\cos \theta - 3) = 0$

$(\cos \theta + 1)(2\cos \theta - 1)(\cos \theta + 3)$

-1	2	7	2	-3
		-2	-5	0
2	5	-3		

\swarrow
 $\cos \theta = -1$

\downarrow
 $\cos \theta = 1/2$

\rightarrow
 $\cos \theta = -3$

NO SOLUTION

$\theta = \pi$

$\theta = \pi/3$

$\theta = 5\pi/3$

c) $3 - 3\sin \theta - 2\cos^2 \theta = 0$

$3 - 3\sin \theta - 2(1 - \sin^2 \theta) = 0$

$3 - 3\sin \theta - 2 + 2\sin^2 \theta = 0$

$2\sin^2 \theta - 3\sin \theta + 1 = 0$

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

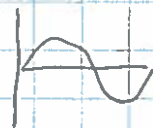
\swarrow
 $\sin \theta = 1/2$

\rightarrow
 $\sin \theta = 1$

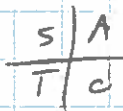
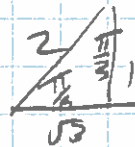
$\theta = \pi/2$

$\theta = \pi/6$

$\theta = 5\pi/6$



TRIG EQUATIONS



$$7a) \quad \sin 2\theta = \frac{1}{2} \quad 0 \leq 2\theta \leq 2\pi$$

$$2\theta = \frac{\pi}{6}, \frac{5\pi}{6}$$

$$\theta = \frac{\pi}{12}, \frac{5\pi}{12}$$

$$b) \quad \cos 2\theta = -\frac{\sqrt{3}}{2} \quad 0 \leq 2\theta \leq 2\pi$$

$$2\theta = \frac{5\pi}{6}, \frac{7\pi}{6}$$

$$\theta = \frac{5\pi}{12}, \frac{7\pi}{12}$$

$$c) \quad \tan 2\theta = \sqrt{3} \quad 0 \leq 2\theta \leq 2\pi$$

$$2\theta = \frac{\pi}{3}, \frac{4\pi}{3}$$

$$\theta = \frac{\pi}{6}, \frac{4\pi}{6}$$

$$= \frac{\pi}{6}, \frac{2\pi}{3}$$

$$d) \quad \cos 2\theta = \cos^2 \theta \quad -\pi \leq \theta \leq \pi$$

$$2\cos^2 \theta - 1 - \cos^2 \theta = 0$$

$$\cos^2 \theta - 1 = 0$$

$$\cos^2 \theta = 1$$

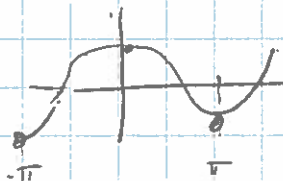
$$\cos \theta = \pm 1$$

$$\cos \theta = 1$$

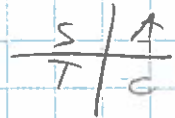
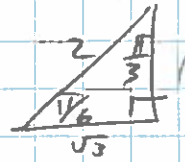
$$\theta = 0$$

$$\cos \theta = -1$$

$$\theta = -\pi, \pi$$



TRIG EQUATIONS



7e) $\sin 2\theta = \cos \theta$

$-\pi < 2\theta \leq \pi$

$\therefore -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$

$2 \sin \theta \cos \theta = \cos \theta$

$2 \sin \theta = 1$

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

$\theta = \frac{\pi}{6}, -\frac{\pi}{6}$

7f)

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

$0 \leq 2\theta \leq \pi$

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

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

$\cos 2\theta = \sin 2\theta$

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

$1 = \tan 2\theta$

ref angle = $\frac{\pi}{4}$

$\therefore 2\theta = \frac{\pi}{4}$

$\theta = \frac{\pi}{8}$

$$g). \tan 2x = 8 \cos^2 x - \cot x, \quad 0 \leq x \leq \frac{\pi}{2}$$

$$\frac{\sin 2x}{\cos 2x} = 8 \cos^2 x - \frac{\cos x}{\sin x}$$

$$\frac{2 \sin x \cos x}{1 - 2 \sin^2 x} = 8 \cos^2 x - \frac{\cos x}{\sin x}$$

$$2 \sin^2 x \cos x = 8 \cos^2 x \sin x (1 - 2 \sin^2 x) - \cos x (1 - 2 \sin^2 x)$$

$$2 \sin^2 x \cos x = 8 \cos^2 x \sin x - 16 \cos^2 x \sin^3 x - \cos x + 2 \cos x \sin^2 x$$

$$0 = 8 \cos^2 x \sin x - 16 \cos^2 x \sin^3 x - \cos x$$

$$0 = 8 \cos x \sin x - 16 \cos x \sin^3 x - 1$$

$$0 = 4(2 \cos x \sin x) - 8 \sin^2 x (2 \cos x \sin x) - 1$$

$$0 = (4 \sin 2x - 8 \sin^2 x \sin 2x) - 1$$

$$0 = 4 \sin 2x (1 - 2 \sin^2 x) - 1$$

$$0 = 4 \sin 2x \cos 2x - 1$$

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

$$0 = 2(\sin 4x) - 1$$

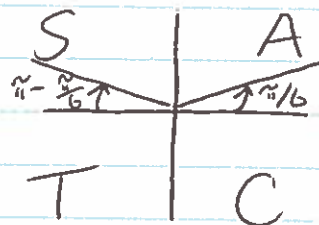
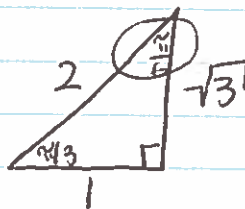
$$\sin 4x = \frac{1}{2}$$

$$4x = \frac{\pi}{6}$$

or

$$4x = \pi - \frac{\pi}{6}$$

$$= \frac{5\pi}{6}$$



SARAH BOWMAN

$$x = \frac{\pi}{24}$$

or

$$x = \frac{5\pi}{24}$$

TRIG EQUATIONS

$$7c) \quad 2(\sin^4 \theta + \cos^4 \theta) = 1$$

$$-\pi \leq \theta \leq \pi$$

$$\sin^4 \theta + \cos^4 \theta = \frac{1}{2}$$

$$-2\pi \leq 2\theta \leq 2\pi$$

$$(\sin^2 \theta + \cos^2 \theta)^2 - 2\sin^2 \theta \cos^2 \theta = \frac{1}{2}$$

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

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

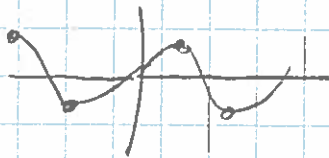
$$-(2 \sin \theta \cos \theta)(\sin \theta \cos \theta) = -\frac{1}{2}$$

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

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

$$\sin^2 2\theta = 1$$

$$\sin 2\theta = \pm 1$$



$$2\theta = \frac{\pi}{2}, \frac{3\pi}{2}, -\frac{\pi}{2}, -\frac{3\pi}{2}$$

$$\theta = \frac{\pi}{4}, \frac{3\pi}{4}, -\frac{\pi}{4}, -\frac{3\pi}{4}$$

OR TO START

$$\rightarrow 2 \sin 2\theta \cos \theta \sin \theta = 1$$

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

$$\sin^2 2\theta = 1$$

$$\sin 2\theta = \pm 1$$

$$2(\sin^2 \theta \sin^2 \theta + \cos^2 \theta \cos^2 \theta) = 1$$

$$\sin^2 \theta (1 - \cos^2 \theta) + \cos^2 \theta (1 - \sin^2 \theta) = \frac{1}{2}$$

$$\sin^2 \theta - \sin^2 \theta \cos^2 \theta + \cos^2 \theta - \cos^2 \theta \sin^2 \theta = \frac{1}{2}$$

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

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

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

7h)

$$\tan \theta + \sec 2\theta = 1$$

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

$$\times \cos \theta \cos 2\theta$$

$$\sin \theta \cos 2\theta + \cos \theta = \cos \theta \cos 2\theta$$

$$\sin \theta \cos 2\theta - \cos \theta \cos 2\theta + \cos \theta = 0$$

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

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

$$\sin \theta \cos 2\theta - \cos \theta (-2\sin^2 \theta) = 0$$

$$\sin \theta \cos 2\theta + 2\cos \theta \sin^2 \theta = 0$$

$$\sin \theta (\cos 2\theta + 2\cos \theta \sin \theta) = 0$$

$$\sin \theta (\cos 2\theta + \sin 2\theta) = 0$$

$$\sin \theta = 0 \quad \cos 2\theta = -\sin 2\theta$$

$$\sin \theta = 0$$

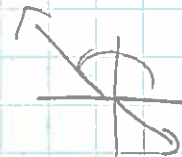
$$\theta = 0, \pi, 2\pi$$



$$\text{let } \theta = \frac{\pi}{4}$$

$$2\theta = \frac{2\pi}{4}$$

$$\theta = \frac{7\pi}{8}$$



$$\text{or } 2\theta = \frac{3\pi}{4}$$

$$\theta = \frac{3\pi}{8}$$

TRIG EQUATIONS

$$7h) \quad \tan \theta + \sec 2\theta = 1 \quad -\frac{\pi}{2} \leq \theta \leq \frac{\pi}{2}$$

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

$$1 \Rightarrow \cos 2\theta = \tan \theta \cos 2\theta$$

$$1 = \cos 2\theta (1 - \tan \theta) \rightarrow 1 = \cos 2\theta \left(1 - \frac{\sin \theta}{\cos \theta}\right)$$

$$\tan \theta + \frac{1}{\cos 2\theta} - 1 = 0$$

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

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