

# Trig Equations

- 1) Replace trig function with x
- 2) Solve for x
- 3) Replace back
- 4) Do inverse to find (reference angle)
- 5) Put reference angle in the two appropriate quadrants

ignore negative when finding reference angle

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\* If 0 or 1, use 0, 90, 180, 270 table; there is no reference angle

## First Degree Trig Equations

For #1-6, solve for the variable in the interval  $0^\circ \leq \theta < 360^\circ$ :

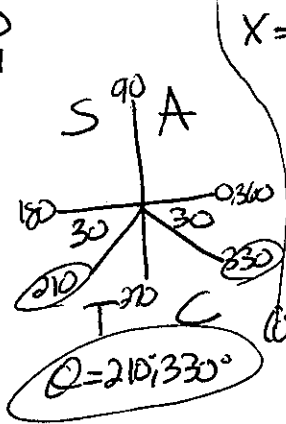
	30	45	60
sin	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$
cos	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$
tan	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$

	0	90	180	270
sin	0	1	0	-1
cos	1	0	-1	0
tan	0	U	0	U

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

2.  $3 \cos \theta + 1 = 1$

$x = \sin \theta$   
 $2x + 1 = 0$   
 $2x = -1$   
 $x = -\frac{1}{2}$   
 $\sin^{-1} \sin(-\frac{1}{2}) = -\frac{1}{2}$   
 $R\theta = 30$

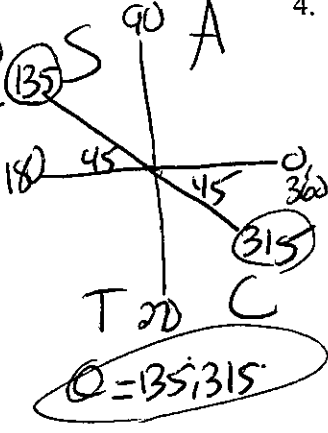


$x = \cos \theta$   
 $3x + 1 = 1$   
 $3x = 0$   
 $x = 0$   
 $\cos^{-1} \cos(0) = 0$   
 $\theta = 90^\circ, 270^\circ$

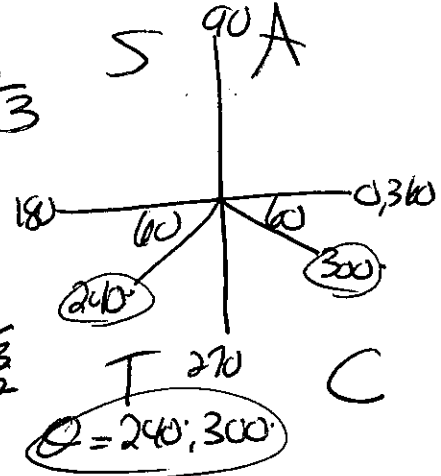
3.  $2 \tan \theta + 2 = 0$

4.  $2 \sin \theta + \sqrt{3} = 0$

$x = \tan \theta$   
 $2x + 2 = 0$   
 $2x = -2$   
 $x = -1$   
 $\tan^{-1} \tan(-1) = -1$   
 $R\theta = 45$



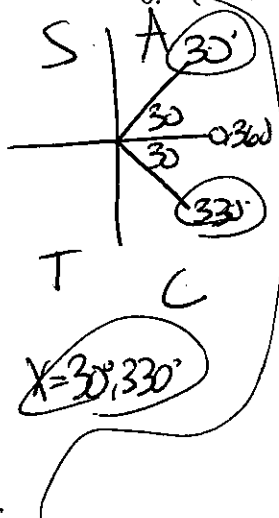
$x = \sin \theta$   
 $2x + \sqrt{3} = 0$   
 $2x = -\sqrt{3}$   
 $x = -\frac{\sqrt{3}}{2}$   
 $\sin^{-1} \sin(-\frac{\sqrt{3}}{2}) = -\frac{\sqrt{3}}{2}$   
 $R\theta = 60$



5.  $3 \cos x - \sqrt{3} = \cos x$

6.  $2(\sin x + 1) = \sin x + 3$

$x = \cos x$   
 $3x - \sqrt{3} = x$   
 $2x - \sqrt{3} = 0$   
 $2x = \sqrt{3}$   
 $x = \frac{\sqrt{3}}{2}$   
 $\cos^{-1} \cos(\frac{\sqrt{3}}{2}) = \frac{\sqrt{3}}{2}$   
 $Rx = 30$



$x = \sin x$   
 $2(x+1) = x+3$   
 $2x+2 = x+3$   
 $x = 1$   
 $\sin^{-1} \sin(1) = 1$   
 $x = 90^\circ$

7.  $\sqrt{4\sin x + 7} = 3$

$X = \sin x$   $(\sqrt{4x+7} = 3)^2$

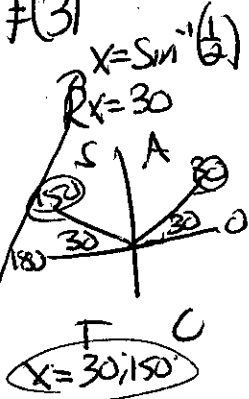
$4x+7=9$

$-7 -7$

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

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

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



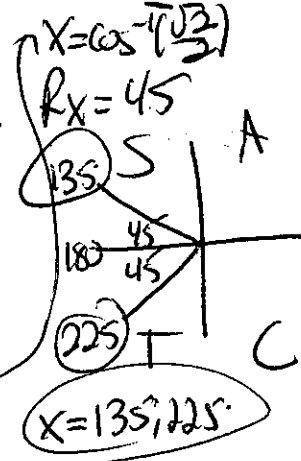
9.  $-\sqrt{2} \sec x = 2$

$X = \sec x$   $-\frac{\sqrt{2}}{\sqrt{2}} x = 2$

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

$\sec x = -\frac{2}{\sqrt{2}}$

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



11.  $-\sqrt{3} \cot x = 1$

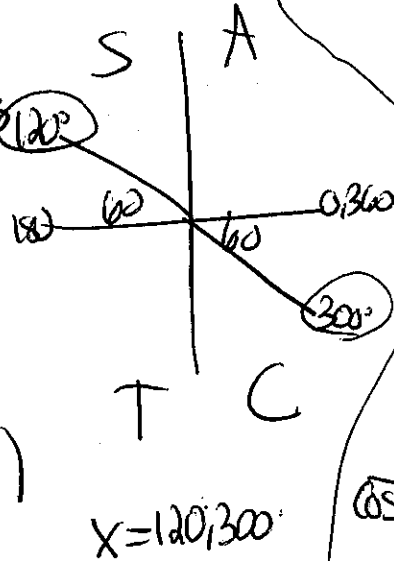
$X = \cot x$   $-\frac{\sqrt{3}}{\sqrt{3}} x = \frac{1}{-\sqrt{3}}$

$x = -\frac{1}{\sqrt{3}}$

$\cot x = -\frac{1}{\sqrt{3}}$

$\tan^{-1} \tan x = -\sqrt{3}$   
 $x = \tan^{-1}(-\sqrt{3})$

$Rx = 60$



8.  $\tan \theta - \sqrt{3} = 0$

$x = \tan \theta$

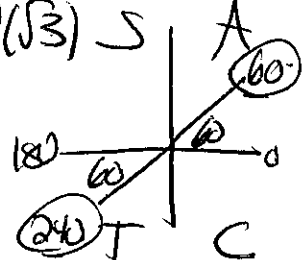
$x = \sqrt{3} = 0$   
 $+ \sqrt{3} + \sqrt{3}$

$x = \sqrt{3}$   
 $\tan^{-1} \sqrt{3}$

$\theta = \tan^{-1}(\sqrt{3})$

$R\theta = 60$

$\theta = 60, 240$



10.  $\sec x - \sqrt{2} = 0$

$X = \sec x$

$x = \sqrt{2} = 0$   
 $+ \sqrt{2} + \sqrt{2}$

$x = \sqrt{2}$

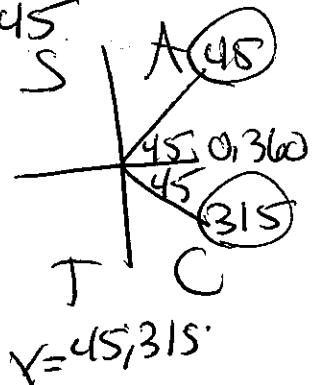
$\sec x = \sqrt{2}$

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

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

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

$Rx = 45$



12.  $-2 \sec x = 4$

$X = \sec x$

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

$x = -2$

$\sec x = -2$

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

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

$Rx = 60$

