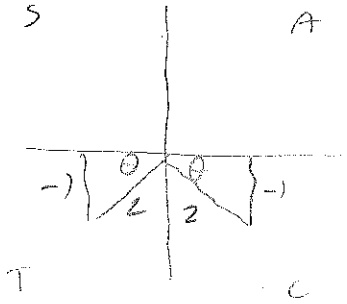
Section 5.3 & 5.2 – I.C.E – Solving Trig Equations

Solve the following trig equations and give all possible solutions in the interval $[0, 2\pi)$.

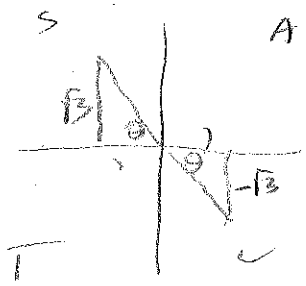
1. $2\sin\theta+1=0$

$\sin\theta = -\frac{1}{2}$ $\quad \theta = \frac{7\pi}{6}, \frac{11\pi}{6}$



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

$\tan\theta = -\sqrt{3}$ $\quad \theta = \frac{2\pi}{3}, \frac{5\pi}{3}$



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

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

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

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

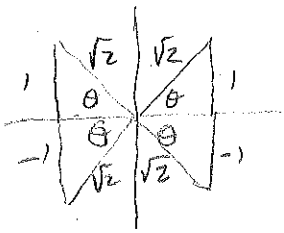
$\theta = \frac{7\pi}{6}, \frac{11\pi}{6}$ $\quad \theta = \frac{3\pi}{2}$

4. $2\sin^2\theta=1$

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

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

$\theta = \frac{\pi}{4}, \frac{3\pi}{4}, \frac{5\pi}{4}, \frac{7\pi}{4}$



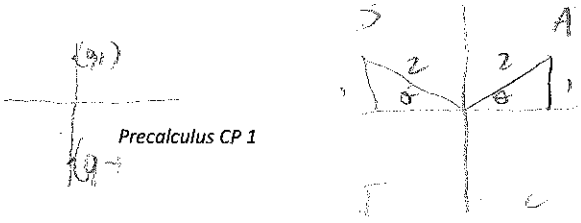
5. $2\cos\theta\sin\theta-\cos\theta=0$

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

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

$\theta = \frac{\pi}{2}, \frac{3\pi}{2}$ $\quad \sin\theta = \frac{1}{2}$

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



Section 5.3 ~~5.2~~ – I.C.E – Solving Trig Equations

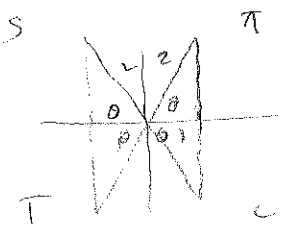
6. $\sin^2\theta = 3\cos^2\theta$

$1-\cos^2\theta = 3\cos^2\theta$

$0 = 4\cos^2\theta - 1$

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

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



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

7. $\sec\theta\csc\theta = 2\csc\theta$

$\sec\theta\csc\theta - 2\csc\theta = 0$

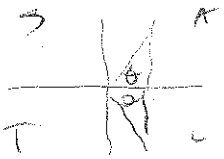
$\csc\theta(\sec\theta - 2) = 0$

$\csc\theta = 0$ $\quad \sec\theta - 2 = 0$

$\frac{1}{\sin\theta} = 0$ $\quad \sec\theta = 2$

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

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



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

8. $\sec^2 x - 1 = 0$

$\sec^2 x = 1$

$\sec x = \pm 1$

$\frac{1}{\cos x} = \pm 1$

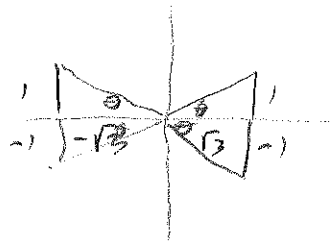
$\cos x = \pm 1$

$x = 0, \pi$

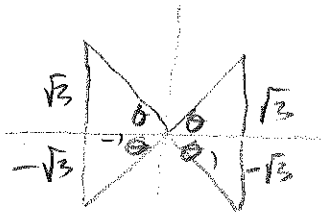
9. $(3\tan^2 x - 1)(\tan^2 x - 3) = 0$

$\tan^2 x = \frac{1}{3}$ $\quad \tan^2 x = 3$

$\tan x = \pm\frac{1}{\sqrt{3}}$ $\quad \tan x = \pm\sqrt{3}$



$\theta = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$



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

10. $2\sin^2 x = 2 + \cos x$

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

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

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

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

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

$\cos x = 0$

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

$\rightarrow 2\cos x + 1 = 0$

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

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