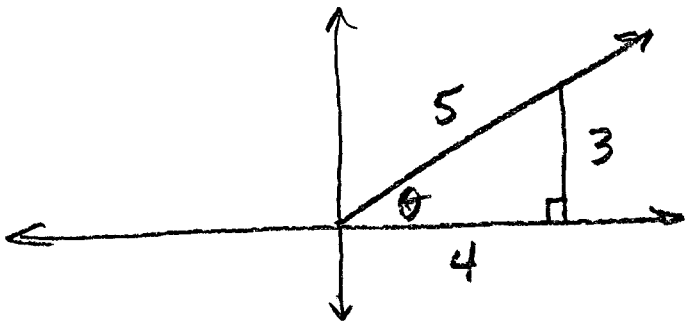
Math 113 Tues. 2-26-13 Class Notes

Pg 190 (31) Exact Value of $\sin 2\theta$, $\cos 2\theta$, and $\tan 2\theta$

$$\sin\theta = \frac{3}{5}, \quad 0 < \theta < \frac{\pi}{2}$$



$\sin 2\theta \Rightarrow 2\sin\theta\cos\theta$

$\Rightarrow 2\left(\frac{3}{5}\right)\left(\frac{4}{5}\right) = \boxed{\frac{24}{25}}$

$\cos 2\theta \Rightarrow \cos^2\theta - \sin^2\theta$

$\left(\frac{4}{5}\right)^2 - \left(\frac{3}{5}\right)^2$

$\frac{16}{25} - \frac{9}{25} = \boxed{\frac{7}{25}}$

$\tan 2\theta \Rightarrow \frac{\sin\theta}{\cos\theta} = \frac{\frac{24}{25}}{\frac{7}{25}} = \boxed{\frac{24}{7}}$

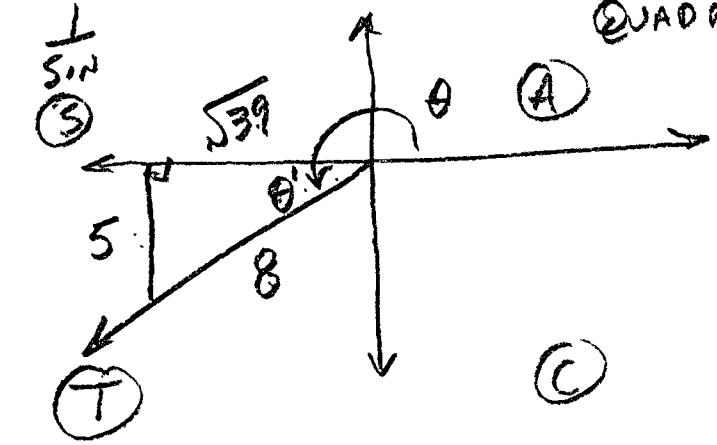
(35) $\sin 2\theta,\ \cos 2\theta;\ \tan 2\theta = ?$

Pg 190

$\csc\theta = -\frac{8}{5} = \frac{H}{O}$ $\quad \pi < \theta < \frac{3\pi}{2}$

$\Downarrow$ QUADRANT 3.

$\frac{1}{\sin}$



$\sin 2\theta \Rightarrow 2\sin\theta\cos\theta$

$2\left(-\frac{5}{8}\right)\left(-\frac{\sqrt{39}}{8}\right) = \boxed{\frac{5\sqrt{39}}{32}}$

$\cos 2\theta \Rightarrow \cos^2\theta - \sin^2\theta$

$\left(-\frac{\sqrt{39}}{8}\right)^2 - \left(-\frac{5}{8}\right)^2$

$\frac{39}{64} - \frac{25}{64} = \frac{14}{64} = \boxed{\frac{7}{32}}$

$\tan 2\theta = \dfrac{\frac{5\sqrt{39}}{32}}{\frac{7}{32}} = \boxed{\frac{5\sqrt{39}}{7}}$

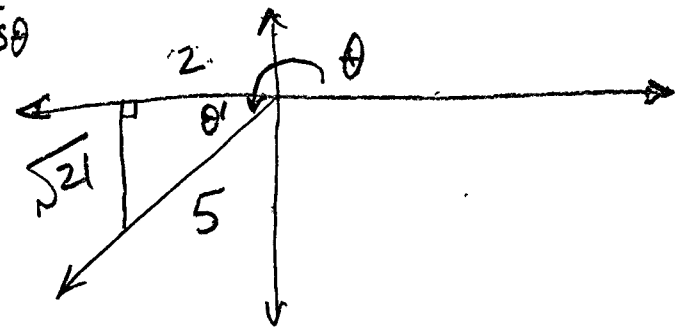
(37) PS 190

$\sin\frac{\theta}{2}, \cos\frac{\theta}{2}, \tan\frac{\theta}{2}$

$\sec\theta = -\frac{5}{2} = \frac{h}{a}, \quad \pi < \theta < \frac{3\pi}{2}$

QUAD III

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



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

$$= \sqrt{\frac{1-\left(-\frac{2}{5}\right)}{2}}$$

$$= \sqrt{\frac{\frac{5}{5}+\frac{2}{5}}{2}} = \sqrt{\frac{\frac{7}{5}}{2}}$$

$$= \sqrt{\frac{7}{10}} = \frac{\sqrt{7}}{\sqrt{10}} \cdot \frac{\sqrt{10}}{\sqrt{10}}$$

$$= \boxed{\frac{\sqrt{70}}{10}}$$

{37 CONT} pg 190

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

$$= -\sqrt{\frac{1+\left(-\frac{2}{5}\right)}{2}}$$

$$= -\sqrt{\frac{\frac{3}{5}}{2}} = -\sqrt{\frac{3}{10}}$$

$$= -\frac{\sqrt{3}}{\sqrt{10}}\cdot\frac{\sqrt{10}}{\sqrt{10}} = -\frac{\sqrt{30}}{10}$$

$$= \boxed{-\frac{\sqrt{30}}{10}}$$

$$\tan\frac{\theta}{2} = \frac{1-\cos\theta}{\sin\theta} = \frac{1-\left(-\frac{2}{5}\right)}{-\frac{\sqrt{21}}{5}}$$

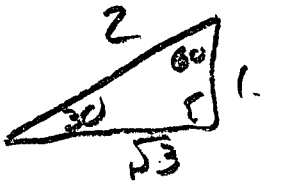
$$= \frac{\frac{7}{5}}{\frac{\sqrt{21}}{5}} = -\frac{7}{\sqrt{21}}\cdot\frac{\sqrt{21}}{\sqrt{21}}$$

$$= -\frac{7\sqrt{21}}{21}$$

$$= \boxed{-\frac{\sqrt{21}}{3}}$$

Pg 202
(19) $\tan^2\theta - \sqrt{3}\tan\theta = 0$

$\tan\theta(\tan\theta - \sqrt{3}) = 0$



$\tan\theta = 0$

$\theta = 0^\circ, 180^\circ$

$\theta = 0, \pi$

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

$\theta = 60^\circ, 240^\circ$ ✓

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

$240 \text{ deg} \cdot \frac{\pi \text{ rad}}{180}$