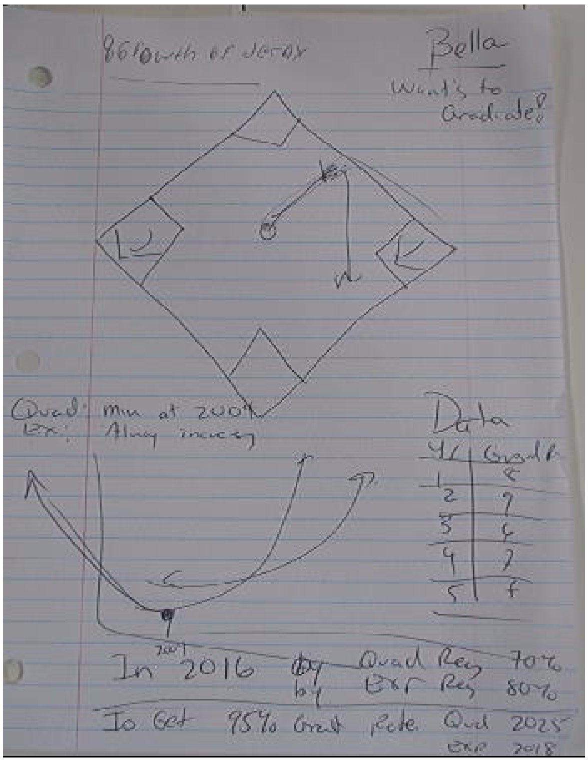


Half Angle Identities

$\cos 2x = 1 - 2\sin^2 x$

$\cos 2x \quad 2\cos^2 x - 1$

$\sin x = \pm\sqrt{\dfrac{1-\cos 2x}{2}}$

$\cos x = \pm\sqrt{\dfrac{1+\cos 2x}{2}}$

$\sin\left(\dfrac{u}{2}\right) = \pm\sqrt{\dfrac{1-\cos u}{2}}$

$\cos\left(\dfrac{u}{2}\right) = \pm\sqrt{\dfrac{1+\cos u}{2}}$

$\cos(15^\circ) = \left(\dfrac{30^\circ}{2}\right) = \pm\sqrt{\dfrac{1+\cos 30^\circ}{2}}$

In Quad I cosine is $+$ $= +\sqrt{\dfrac{1+\sqrt{3}/2}{2}}$

$\cos(15^\circ) = .96\ldots$

$\sqrt{((1+\sqrt{(3)}/2)/2)} = .96\ldots.$

Half-angle identities: Problem type 1

Use a half-angle formula to find the exact value of $\cos 112.5°$.

$$\cos\left(\frac{225°}{2}\right) = \pm\sqrt{\frac{1+\cos(225°)}{2}}$$

$$= \pm\sqrt{\frac{1 + -\sqrt{2}/2}{2}}$$

$\cos(112.5°)$ in QII

cos is $-$

$$\pm\sqrt{\frac{2-\sqrt{2}}{4}}$$

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

$\cos(112.5°) = -.382\ldots$

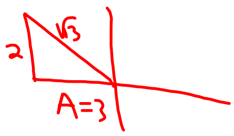
$\sqrt{(2-\sqrt{(2)})}/2 = .382\ldots$

Half-angle identities: Problem type 2

Suppose that $\sin\alpha = \frac{2}{\sqrt{13}}$ and $\frac{\pi}{2} < \alpha < \pi$. QII

(O, H)

Find the exact values of $\sin\frac{\alpha}{2}$ and $\tan\frac{\alpha}{2}$.



$A^2+4=13$

$A^2=9$

$A=-3$

$$\cos\alpha = \frac{A}{H} = \frac{-3}{\sqrt{13}}$$

$$\sin\left(\frac{\alpha}{2}\right) = \pm\sqrt{\frac{1-\cos\alpha}{2}}$$

In Q I

sine is $+$

$$+\sqrt{\frac{1-2/\sqrt{13}}{2}}$$

$$\cos\left(\frac{\alpha}{2}\right) = +\sqrt{\frac{1+2/\sqrt{13}}{2}}$$

In QI

cos is $+$

$$\tan\left(\frac{\alpha}{2}\right) = \frac{\sqrt{\frac{1-2/\sqrt{13}}{2}}}{\sqrt{\frac{1+2/\sqrt{13}}{2}}} = \sqrt{\frac{1-2/\sqrt{13}}{1+2/\sqrt{13}}}$$