Identities

$$\sin(x+y) = \sin x \cos y + \cos x \sin y$$

$$\cos(x+y) = \cos x \cos y - \sin x \sin y$$

$$\sin(x-y) = \sin x \cos y - \cos x \sin y$$

$$\cos(x-y) = \cos x \cos y + \sin x \sin y$$

$$\sin(2x) = 2 \sin x \cos x$$

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

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

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

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

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

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

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

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

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

$$\tan(x+y) = \frac{\sin(x+y)}{\cos(x+y)}$$

Half Angle Identities

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

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

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

$$\pm\sqrt{\frac{1+\cos(2x)}{2}} = \cos(x)$$

$$\cos(x) = \pm\sqrt{\frac{1+\cos(2x)}{2}}$$

$$x = \frac{u}{2} \qquad 2x = u$$

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

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

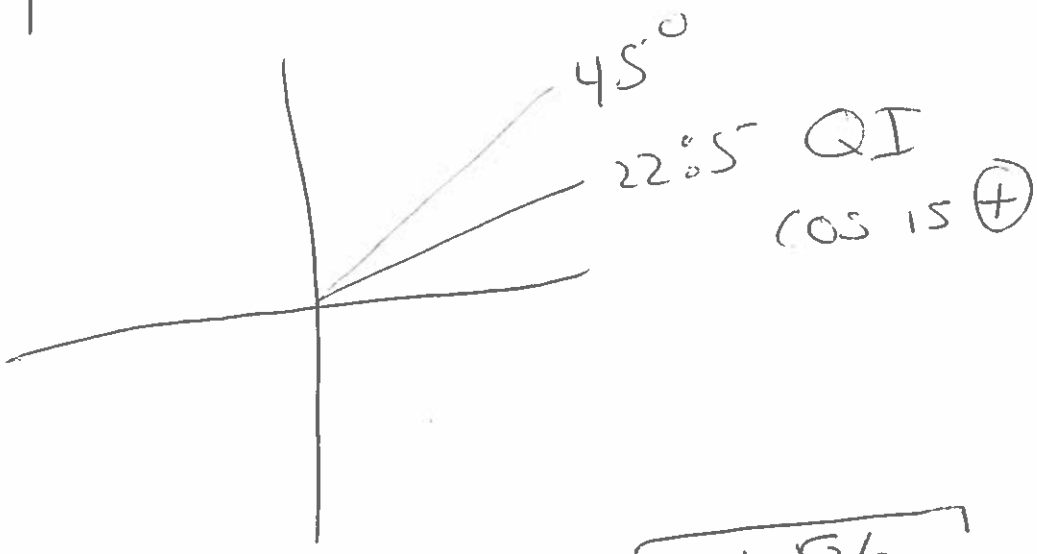
$$\cos(22.5^\circ) =$$

$$\downarrow$$

$$\cos\left(\frac{45^\circ}{2}\right) = \pm\sqrt{\frac{1+\cos(45^\circ)}{2}}$$

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

Tricky



$$\cos(22.5^\circ) = \sqrt{\frac{1+\sqrt{2}/2}{2}}$$