

## Section 8.4: Sum & Difference Formulas

$$\sin(u+v) = \sin u \cos v + \cos u \sin v$$

$$\sin(u-v) = \sin u \cos v - \cos u \sin v$$

$$\cos(u+v) = \cos u \cos v - \sin u \sin v$$

$$\cos(u-v) = \cos u \cos v + \sin u \sin v$$

$$\tan(u+v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$

$$\tan(u-v) = \frac{\tan u - \tan v}{1 + \tan u \tan v}$$

$$\sin 75^\circ = \sin(30^\circ + 45^\circ)$$

$$= \sin 30^\circ \cos 45^\circ + \cos 30^\circ \sin 45^\circ$$

$$\frac{1}{2} \cdot \frac{\sqrt{2}}{2} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2}$$

$$\frac{\sqrt{2}}{4} + \frac{\sqrt{6}}{4} = \frac{\sqrt{2} + \sqrt{6}}{4}$$

$$\cos 75^\circ = \frac{\sqrt{6} - \sqrt{2}}{4}$$

$$\tan 75^\circ = \frac{\overset{=\frac{\sqrt{3}}{3}}{\tan 30^\circ} + \overset{=1}{\tan 45^\circ}}{1 - \underset{=\frac{\sqrt{3}}{3} \cdot 1}{\tan 30^\circ \tan 45^\circ}}$$

$$= \frac{\frac{\sqrt{3}}{3} + 1}{1 - \frac{\sqrt{3}}{3}} \cdot \frac{3}{3} = \frac{(\sqrt{3} + 3)(3 + \sqrt{3})}{3 - \sqrt{3}} \cdot \frac{3 + \sqrt{3}}{3 + \sqrt{3}}$$

$$2 + \sqrt{3} = \frac{\cancel{6}(2 + \sqrt{3})}{\cancel{6}} \leftarrow \frac{12 + 6\sqrt{3}}{6} \leftarrow \frac{3\sqrt{3} + 3 + 9 + 3\sqrt{3}}{9 - 3}$$

$$\begin{aligned} & \cos(25^\circ)\cos(15^\circ) - \sin(25^\circ)\sin(15^\circ) \\ &= \cos(25^\circ + 15^\circ) = \underline{\underline{\cos 40^\circ}} \end{aligned}$$