

## 5.4 Sum and Difference Formulas

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

$$\cos(u \pm v) = \cos u \cos v \mp \sin u \sin v$$

$$\tan(u \pm v) = \frac{\tan u \pm \tan v}{1 \mp \tan u \tan v}$$

These formulas are used to find the exact value w/o calculator.

$$\begin{aligned} 1. \cos(105^\circ) &= \\ &\cos(60^\circ + 45^\circ) \\ &\cos 60^\circ \cos 45^\circ - \sin 60^\circ \sin 45^\circ \\ &\frac{1}{2} \cdot \frac{1}{\sqrt{2}} - \frac{\sqrt{3}}{2} \cdot \frac{1}{\sqrt{2}} \\ &\frac{1}{2\sqrt{2}} - \frac{\sqrt{3}}{2\sqrt{2}} = \frac{1-\sqrt{3}}{2\sqrt{2}} \end{aligned}$$

$$\begin{aligned} 2. \sin \frac{5\pi}{12} &= \\ &\sin\left(\frac{\pi}{4} + \frac{\pi}{6}\right) \end{aligned}$$

$$3. \sin 106^\circ \cos 16^\circ - \cos 106^\circ \sin 16^\circ$$

$$\sin(106^\circ - 16^\circ)$$

$$\sin 90^\circ = 1$$

These formulas can also be used to prove identities.

$$\cos\left(\frac{\pi}{2} - x\right) = \sin x$$

$$\cos\frac{\pi}{2} \cdot \cos x + \sin\frac{\pi}{2} \cdot \sin x$$

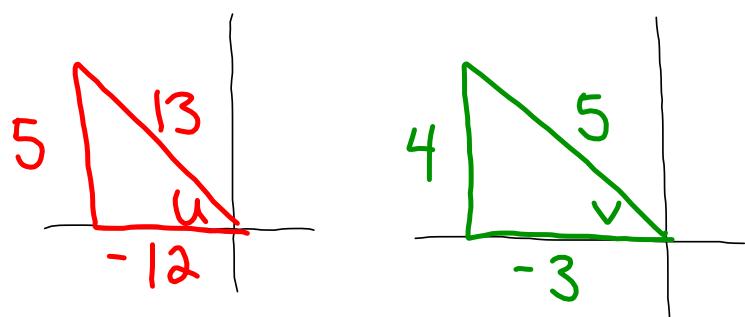
~~$$0 \cdot \cos x + 1 \cdot \sin x$$~~

$$\sin x = \sin x$$

And....to evaluate trig angle sums and differences.

Given  $\sin u = \frac{5}{13}$  and  $\cos v = -\frac{3}{5}$  in QII find:

$$\sin(u - v) = \underline{\sin u} \underline{\cos v} - \cos u \sin v$$



$$\frac{5}{13} \cdot \frac{-3}{5} - \frac{-12}{13} \cdot \frac{4}{5}$$

$$-\frac{15}{65} + \frac{48}{65} = \frac{33}{65}$$

## Homework

p 384 3, 7, 15, 21, 23-29 odd,  
35-41 odd, 47, 52, 63

*due thurs!*