

## Ing 7.3 Addition & Subtraction of Functions

Given two angles  $u$  &  $v$

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

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

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

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

EX.  $\sin(30^\circ + 60^\circ) = \sin 90^\circ = 1$

$$\begin{aligned} \sin(30^\circ + 60^\circ) &= \sin 30^\circ \cos 60^\circ + \cos 30^\circ \sin 60^\circ \\ &= \frac{1}{2} \cdot \frac{1}{2} + \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{3}}{2} \\ &= \frac{1}{4} + \frac{3}{4} = 1 \end{aligned}$$

Exam prob Use  $\frac{11\pi}{12} = \frac{2\pi}{3} + \frac{\pi}{4}$  to compute  $\sin \frac{11\pi}{12}$

$$\sin\left(\frac{2\pi}{3} + \frac{\pi}{4}\right) = \sin \frac{2\pi}{3} \cos \frac{\pi}{4} + \cos \frac{2\pi}{3} \sin \frac{\pi}{4}$$

$$\begin{aligned} &= \sin 60^\circ \cdot \cos 45^\circ + (-\cos 60^\circ) \sin 45^\circ \\ &= \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} - \frac{1}{2} \cdot \frac{\sqrt{2}}{2} \\ &= \frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4} \end{aligned}$$

Simplify  $\cos 3 \sin 2 - \cos 2 \sin 3$  (change to sin or cos)

$$u=2 \quad v=3 \quad \sin(u-v) = \sin(2-3) \quad \sin(-1) = \boxed{-\sin 1}$$

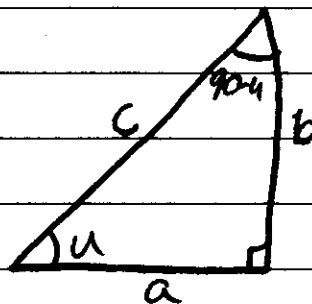
$$\tan(u+v) = \frac{\tan u + \tan v}{1 - \tan u \tan v}$$

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

# Trig 7.3

## Cofunctions

$\sin(90^\circ - u) = \cos u$
$\cos(90^\circ - u) = \sin u$
$\tan(90^\circ - u) = \cot u$
$\cot(90^\circ - u) = \tan u$
$\sec(90^\circ - u) = \csc u$
$\csc(90^\circ - u) = \sec u$



Simplify  $\sin 90^\circ - u = \frac{a}{c}$   
 $\cos u = \frac{a}{c}$

Express as a cofunction of a complementary angle  $\tan \frac{\pi}{6}$   
 $\tan \frac{\pi}{6} = \cot(90^\circ - \frac{\pi}{6})$   
 $\cot(\frac{\pi}{2} - \frac{\pi}{6}) = \cot(\frac{\pi}{3})$  or  $\cot(90^\circ - 30^\circ) = \cot 60^\circ$

Exam prob

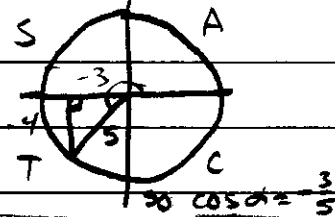
Given  $\sin \alpha = -\frac{4}{5}$   $\alpha$  in QIII,  $\sec \beta = \frac{5}{3}$   $\beta$  in QI, find  $\cos(\alpha - \beta)$

$$\cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$-\frac{3}{5} \cdot \frac{3}{5} + (-\frac{4}{5}) (\frac{4}{5})$$

$$-\frac{9}{25} + -\frac{16}{25} = -1$$

$\sin \alpha = -\frac{4}{5}$  in QIII



$\sec \beta = \frac{5}{3}$  in QI

