Notes Section 5.4 – Sum and Difference Identities

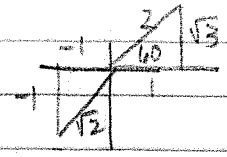
$\sin(u+v) = \sin u\cos v + \sin v\cos u$
$\sin(u-v) = \sin u\cos v - \sin v\cos u$
$\cos(u+v) = \cos u\cos v - \sin u\sin v$
$\cos(u-v) = \cos u\cos v + \sin u\sin v$

• find the exact value.

1. $\cos 75° = \cos(45° + 30°)$
$= \cos 45°\cos 30° - \sin 45°\sin 30°$
$= (\sqrt{2}/2)(\sqrt{3}/2) - (\sqrt{2}/2)(1/2)$
$= \sqrt{6}/4 - \sqrt{2}/4$
$= \boxed{\dfrac{\sqrt{6}-\sqrt{2}}{4}}$

2. $\sin 11\pi/12 = \sin(5\pi/4 - \pi/3)$
$\sin 5\pi/4\cos\pi/3 - \sin\pi/3\cos 5\pi/4$
$(-\sqrt{2}/2)(1/2) - (\sqrt{3}/2)(-\sqrt{2}/2)$
$= (-\sqrt{2}/4) + (\sqrt{6}/4)$
$= \boxed{\dfrac{-\sqrt{2}+\sqrt{6}}{4}}$

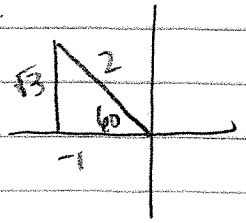
$165° = 225 - 60$



$\tan x = \sin x/\cos x$ $\sec x = 1/\cos x$

• find the exact value

3. $\cos 7\pi/8\cos 5\pi/24 + \sin 7\pi/8\sin 5\pi/24$
$\cos(7\pi/8 - 5\pi/24)$
$\cos(21\pi/24 - 5\pi/24)$
$\cos(16\pi/24) = \cos(2\pi/3) = \boxed{-1/2}$



• simplify

4. $\sin \pi/3 \cos \pi/4 + \cos \pi/3 \sin \pi/4$

$\sin(\pi/3 + \pi/4)$

$\sin(4\pi/12 + 3\pi/12)$

$\boxed{\sin(7\pi/12)}$

• verify

5. $\cos(\pi/2 - x) = \sin x$

$\cos \pi/2 \cos x + \sin \pi/2 \sin x = \sin x$

$(0)\cos x + (1)\sin x = \sin x$

$\sin x = \sin x$

• solve

6. $\sin(x + \pi/4) - \sin(x - \pi/4) = 0$

$\sin x \cos \pi/4 + \cos x \sin \pi/4 - [\sin x \cos \pi/4 - \cos x \sin \pi/4) = 0$

~~$\sin x(\sqrt{2}/2)$~~ $+ \cos x(\sqrt{2}/2) -$ ~~$\sin x(\sqrt{2}/2)$~~ $+ \cos x(\sqrt{2}/2) = 0$

$\sqrt{2}/2 \cos x + \sqrt{2}/2 \cos x = 0$

$\sqrt{2} \cos x = 0$

$\cos x = 0$

$\boxed{x = \pi/2, 3\pi/2}$