Review :-)

$\cos A = -\frac{15}{17}$ $A \in$ QII $\quad \cos B = \frac{12}{13}$ $B \in$ QI

$\sin A = \frac{8}{17}$ $\quad \sin B = \frac{5}{13}$

a) $\sin(A+B) = \sin A \cos B + \cos A \sin B$

$= \frac{8}{17}\frac{12}{13} + \left(\frac{-15}{17}\right)\left(\frac{5}{13}\right)$

$= \frac{96 - 75}{221}$

$= \boxed{\frac{21}{221}}$

b) $\cos(A+B) = \cos A \cos B - \sin A \sin B$

$= \frac{-15}{17}\frac{12}{13} - \frac{8}{17}\frac{5}{13}$

$= \frac{-180 - 40}{221}$

$= \boxed{\frac{-220}{221}}$

c) $\tan(A+B) = \boxed{-\frac{21}{220}}$

d) $\sin(A-B) = \sin A \cos B - \cos A \sin B$

$= \frac{96+75}{221}$

$= \frac{171}{221}$

e) $\cos(A-B) = \cos A \cos B + \sin A \sin B$

$= \frac{-180+40}{221}$

$= -\frac{140}{221}$

f) $\tan(A-B) = -\frac{171}{140}$

$\cos A = -\frac{4}{5}$ $A \in$ QII $\quad 90^\circ < \frac{A}{2} < 180^\circ$

$\sin A = \frac{3}{5}$ $\quad \frac{A}{2} \in$ QI

a) $\sin 2A = 2 \sin A \cos A$

$= 2\left(\frac{3}{5}\right)\left(-\frac{4}{5}\right)$

$= -\frac{24}{25}$

b) $\cos 2A = \cos^2 A - \sin^2 A$

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

$= \frac{7}{25}$

c) $\tan 2A = -\frac{24}{7}$

d) $\sin \frac{A}{2} = \sqrt{\frac{1}{2}(1 - \cos A)}$

$= \sqrt{\frac{1}{2}\left(1 + \frac{4}{5}\right)}$

$= \frac{3}{\sqrt{10}}$

e) $\cos \frac{A}{2} = \sqrt{\frac{1}{2}(1 + \cos A)}$

$= \sqrt{\frac{1}{2}\left(1 - \frac{4}{5}\right)}$

$= \frac{1}{\sqrt{10}}$

f) $\tan \frac{A}{2} = 3$

$4\sin^2 x + 4\cos x - 5 = 0 \qquad [0, 2\pi)$

$4(1 - \cos^2 x) + 4\cos x - 5 = 0$

$-4\cos^2 x + 4\cos x - 1 = 0$

$\cos x = \dfrac{-4 \pm 0}{-8} = \dfrac{1}{2}$

$x = \dfrac{\pi}{3}, \dfrac{5\pi}{3}$

$\tan^2 x \sin x = \sin x$

$\tan^2 x \sin x - \sin x = 0$

$\sin x (\tan^2 x - 1) = 0$

$\sin x = 0 \qquad \tan x = \pm 1$

$x = 0, \pi, \dfrac{\pi}{4}, \dfrac{3\pi}{4}, \dfrac{5\pi}{4}, \dfrac{7\pi}{4}$

$2\tan x \csc x + 2\csc x + \tan x + 1 = 0$

$2\csc x (\tan x + 1) + (\tan x + 1) = 0$

$(\tan x + 1)(2\csc x + 1) = 0$

$\tan x = -1 \qquad \csc x = -\dfrac{1}{2}$

$\sin x = -2$ ##

$x = \dfrac{3\pi}{4}, \dfrac{7\pi}{4}$

1 $\sin\theta - \sqrt{3}\cos\theta = 1$

$\frac{1}{2}\sin\theta - \frac{\sqrt{3}}{2}\cos\theta = \frac{1}{2}$

$\sin\theta\cos\frac{\pi}{3} - \cos\theta\sin\frac{\pi}{3} = \frac{1}{2}$

$\sin\left(\theta - \frac{\pi}{3}\right) = \frac{1}{2}$?

$\theta - \frac{\pi}{3} = \frac{\pi}{6}$

$\theta = \frac{\pi}{6} + \frac{\pi}{3}$

$= \frac{\pi}{2}$

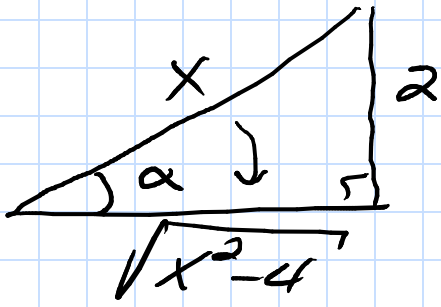
$\theta - \frac{\pi}{3} = \frac{5\pi}{6}$

$\theta = \frac{5\pi}{6} + \frac{\pi}{3}$

$= \frac{7\pi}{6}$

$$\sec\left(\underbrace{\tan^{-1}\frac{2}{\sqrt{x^2-4}}}_{\alpha}\right)$$

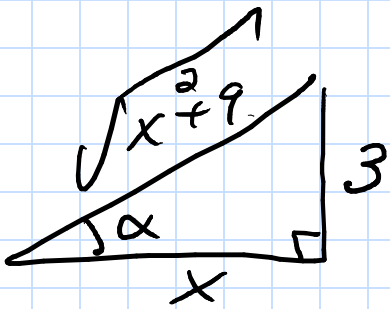
$$\tan\alpha = \frac{2}{\sqrt{x^2-4}}$$



$$\sec\alpha = \frac{x}{\sqrt{x^2-4}}$$

$$\sin\left(\underbrace{\cos^{-1}\frac{x}{\sqrt{x^2+9}}}_{\alpha}\right)$$

$$\cos\alpha = \frac{x}{\sqrt{x^2+9}}$$



$$\sin\alpha = \frac{3}{\sqrt{x^2+9}}$$

$(3, 270°)$ (x, y)?

$x = r\cos\theta$
$= 3\cos 270°$
$= 0$

$y = r\sin\theta$
$= 3\sin 270°$
$= -3$

$(x, y) = (0, -3)$

$(-1, \sqrt{3})$ (r, θ)?

$r = \sqrt{x^2 + y^2}$
$= \sqrt{1+3}$
$= 2$

$\theta = \tan^{-1}\left|\frac{y}{x}\right|$
$= \tan^{-1}\frac{\sqrt{3}}{1}$
$= 60°$

$\sqrt{3}/2$

$(r, \theta) = (2, 120°)$ ②

$r = 8\sin\theta - 2\cos\theta$

$r^2 = 8r\sin\theta - 2r\cos\theta$

$x^2 + y^2 = 8y - 2x$

$x^2 + 2x + (1)^2 + y^2 - 8y + (-4)^2 = 1 + 16$

$(x+1)^2 + (y-4)^2 = 17$

center $(-1, 4)$ radius $\sqrt{17}$

$x^2 + y^2 = 4x$

$r^2\cos^2\theta + r^2\sin^2\theta = 4r\cos\theta \quad (r \neq 0)$

$r(\cos^2\theta + \sin^2\theta) = 4\cos\theta$

$\underline{r = 4\cos\theta}$

$\sqrt{3} - i$ $\qquad x = \sqrt{3}$, $y = -1$

$r = \sqrt{x^2 + y^2}$ $\qquad \theta = \tan^{-1}\left|\frac{1}{\sqrt{3}}\right| \quad \frac{\pi}{6}$

$= \sqrt{3+1}$

$= 2$

$\underline{\sqrt{3} - i = 2\,\mathrm{cis}\,\frac{11\pi}{6}}$

$3\,\mathrm{cis}\,210^\circ = 3(\cos 210^\circ + i\sin 210^\circ)$

$= -3\frac{\sqrt{3}}{2} - i\,3\frac{1}{2}$

$= -\frac{3\sqrt{3}}{2} - \frac{3}{2}i$

$$\frac{15\ \mathrm{cis}(210^\circ)}{3\ \mathrm{cis}(150^\circ)} = 5\ \mathrm{cis}(210^\circ - 150^\circ)$$

$$= 5\ \mathrm{cis}\,60^\circ$$

$$= 5\cos 60^\circ + i\,5\sin 60^\circ$$

$$= \frac{5}{2} + \frac{5}{2}i$$

$$(15\ \mathrm{cis}\,210^\circ)(5\ \mathrm{cis}\,150^\circ) = 75\ \mathrm{cis}\,360^\circ$$

$$= 75(\cos 360^\circ + i\sin 360^\circ)$$

$$= 75$$