$a = 30°$

#2a $\quad \sin 2a = 2 \sin a \cos a$

$\quad \sin 2(30°) = 2 \sin 30° \cos 30°$

$\quad \sin 60° = 2 \cdot \left(\frac{1}{2}\right)\left(\frac{\sqrt{3}}{2}\right)$

$$\frac{\sqrt{3}}{2} = \frac{2\sqrt{3}}{4_2}$$

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

2b) $\quad \cos 2a = \cos^2 a - \sin^2 a$

$\quad \cos 2(30°) = \cos^2 30° - \sin^2 30°$

$\quad \cos 60° = \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{1}{2}\right)^2$

$$\frac{1}{2} = \frac{3}{4} - \frac{1}{4}$$

$$\frac{1}{2} = \frac{2}{4}$$

$$\frac{1}{2} = \frac{1}{2}$$

255 $a = 30°$

2c) $\cos 2a = 2\cos^2 a - 1$

$\cos 2(30°) = 2\cos^2(30°) - 1$

$\cos 60° = 2\left(\dfrac{\sqrt{3}}{2}\right)^2 - 1$

$\dfrac{1}{2} = 2\left(\dfrac{3}{4}\right) - 1$

$\dfrac{1}{2} = \dfrac{6}{4} - 1$

$\dfrac{1}{2} = \dfrac{6}{4} - \dfrac{4}{4}$

$\dfrac{1}{2} = \dfrac{2}{4}$

$\dfrac{1}{2} = \dfrac{1}{2}$

255

2d

$a = 30°$

$\cos 2a = 1 - 2\sin^2 a$

$\cos 2(30°) = 1 - 2\sin^2 30°$

$\cos 60° = 1 - 2\left(\frac{1}{2}\right)^2$

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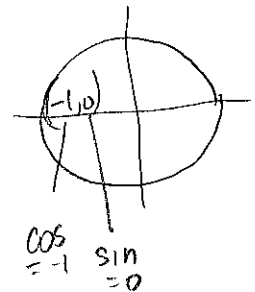
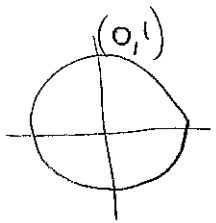$\frac{1}{2} = 1 - \frac{2}{4}$

$\frac{1}{2} = \frac{1}{2}.$

255

3a) $\sin(\overset{a}{\pi} + \overset{b}{x})$

$\sin(a+b) = \sin a \cos b + \sin b \cos a$

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

$= 0 \cdot \cos x + \sin x \cdot -1$

$= 0 + -\sin x$

$= \boxed{-\sin x}$

3b) $\cos(\overset{a}{\pi} + \overset{b}{x}) = \cos a \cos b - \sin a \sin b$

$= \cos \pi \cos x - \sin \pi \sin x$

$= -1 \cos x - 0 \sin x$

$= -\cos x - 0$

$= \boxed{-\cos x}$

3c) $\sin(\overset{a}{\tfrac{\pi}{2}} + \overset{b}{x}) = \sin a \cos b + \sin b \cos a$

$\sin \tfrac{\pi}{2} \cos x + \sin x \cos \tfrac{\pi}{2}$

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

$\boxed{= \cos x}$

3d) $\cos(\overset{a}{\tfrac{\pi}{2}} + \overset{b}{x}) = \cos a \cos b - \sin a \sin b$

$\cos \tfrac{\pi}{2} \cos x - \sin \tfrac{\pi}{2} \sin x$

$0 \cos x - 1 \sin x$

$0 - 1 \sin x$

$= \boxed{-\sin x}$

25
$4a)$

$\sin a = \frac{3}{5}$ $\sin b = \frac{12}{13}$ $0 \leq a \leq \frac{\pi}{2}$ $0 \leq b \leq \frac{\pi}{2}$

$\cos a = \frac{4}{5}$ $\cos b = \frac{5}{13}$

$\tan a = 3/4$ $\tan b = \frac{12}{5}$

$\sin(a+b) = \sin a \cos b + \sin b \cos a$

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

$$\frac{15}{65} + \frac{48}{65} = \boxed{\frac{63}{65}}$$
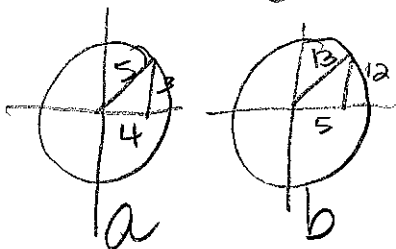
b) $\cos(a+b) = \cos a \cos b - \sin a \sin b$

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

$$\frac{20}{65} - \frac{36}{65} = \boxed{\frac{-16}{65}}$$

c) $\tan(a+b)$

$\tan a = \frac{3}{4}$

$\tan b = \frac{12}{5}$

$$\frac{\tan a + \tan b}{1 - \tan a \tan b}$$

$$\frac{\frac{3}{4} + \frac{12}{5}}{1 - \frac{3}{4} \cdot \frac{12}{5}}$$

$$\frac{\frac{15+48}{20}}{1 - \frac{36}{20}} = \frac{\frac{63}{20}}{\frac{-16}{20}} \qquad \frac{63}{20} \times \frac{20}{-16} = \boxed{\frac{63}{-16}}$$

255. $\sin a = 3/5. \quad \cos a = 4/5$

4d)   Sin 2a.

Double Angle

$\sin 2a = 2 \sin a \cos a$

$\sin 2a = 2 \cdot \dfrac{3}{5} \cdot \dfrac{4}{5}$

$\sin 2a = \boxed{\dfrac{24}{25}}$

4e) $\cos 2a = \cos^2 a - \sin^2 a$

Double Angle

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

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

$\cos 2a = \boxed{\dfrac{7}{25}}$