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C +  
T -

$$1. \sin(97+43^\circ) = \boxed{\sin(140^\circ)}$$

$$2. \cos(72-130^\circ) = \cos(58^\circ) = \boxed{\cos(58^\circ)}$$

$$3. \tan(140-60) = \boxed{\tan(80^\circ)}$$

$$4. \sin\left(\frac{\pi}{5} - \frac{2\pi}{3}\right) = \sin\left(\frac{3\pi}{15} - \frac{10\pi}{15}\right) = \sin\left(-\frac{7\pi}{15}\right) = \boxed{-\sin\left(\frac{7\pi}{15}\right)}$$

$$5. \cos\left(\frac{\pi}{6} + \frac{\pi}{7}\right) = \cos\left(\frac{7\pi}{42} + \frac{6\pi}{42}\right) = \boxed{\cos\left(\frac{13\pi}{42}\right)}$$

$$6. \tan\left(\frac{\pi}{3} + \frac{\pi}{4}\right) = \tan\left(\frac{4\pi}{12} + \frac{3\pi}{12}\right) = \boxed{\tan\left(\frac{7\pi}{12}\right)}$$

$$7. \tan(105^\circ) = -\tan(105^\circ) = -\tan(45^\circ + 60^\circ)$$

$$= -\left[\frac{\tan 45^\circ + \tan 60^\circ}{1 - \tan 45^\circ \tan 60^\circ}\right]$$

$$= -\left[\frac{1 + \sqrt{3}}{1 - 1(\sqrt{3})}\right]$$

$$= -\left[\frac{1 + \sqrt{3}}{1 - \sqrt{3}}\right] \cdot \frac{(1 + \sqrt{3})}{(1 + \sqrt{3})}$$

$$= -\left[\frac{1 + \sqrt{3} + \sqrt{3} + 3}{1 - 3}\right]$$

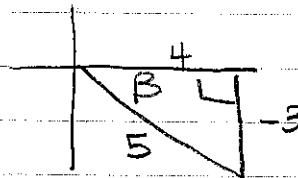
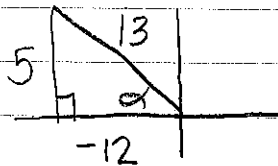
$$= -\left[\frac{4 + 2\sqrt{3}}{-2}\right]$$

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

$$= \boxed{2 + \sqrt{3}}$$

$$\begin{aligned}
 8. \sin 345^\circ &= \sin(300^\circ + 45^\circ) \\
 &= \sin 300^\circ \cos 45^\circ + \cos 300^\circ \sin 45^\circ \\
 &= \frac{-\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} + \frac{1}{2} \cdot \frac{\sqrt{2}}{2} \\
 &= \frac{-\sqrt{6}}{4} + \frac{\sqrt{2}}{4} \\
 &= \frac{-\sqrt{6} + \sqrt{2}}{4}
 \end{aligned}$$

9-11 →



9.  $\sin(\alpha - \beta)$

$$\sin \alpha \cos \beta - \cos \alpha \sin \beta$$

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

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

10.  $\cos(\beta + \alpha)$

$$\cos \beta \cos \alpha - \sin \beta \sin \alpha$$

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

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

$$\frac{-5}{12} + \frac{9}{12}$$

$$1 + \frac{15}{48}$$

$$\frac{4/12}{\frac{48}{48} + \frac{15}{48}}$$

$$\frac{1/3}{63/48}$$

11.  $\tan(\alpha - \beta) = \frac{\tan \alpha - \tan \beta}{1 + \tan \alpha \tan \beta}$

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

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

$$\frac{1}{3} \cdot \frac{48}{63} = \frac{48}{189} = \boxed{\frac{16}{63}}$$

12-13 →

$$\begin{array}{|c|} \hline -4 \\ \hline \theta \\ \hline -3 \\ \hline 5 \\ \hline \end{array}$$

12.  $\cos(\theta + \frac{\pi}{3})$

$$\cos\theta \cos\frac{\pi}{3} - \sin\theta \sin\frac{\pi}{3}$$

$$\frac{-4}{5} \cdot \frac{1}{2} - \frac{-3}{5} \cdot \frac{\sqrt{3}}{2}$$

$$\frac{-4}{10} + \frac{3\sqrt{3}}{10}$$

$$\boxed{\frac{-4 + 3\sqrt{3}}{10}}$$

13.  $\tan(2\theta)$

$$\tan(\theta + \theta)$$

$$\frac{\tan\theta + \tan\theta}{1 - \tan\theta \tan\theta}$$

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

$$\frac{\frac{6}{4}}{1 - \frac{9}{16}} = \frac{\frac{3}{2}}{\frac{16}{16} - \frac{9}{16}} =$$

$$\frac{\frac{3}{2}}{\frac{7}{16}} = \frac{3}{2} \cdot \frac{16}{7} = \boxed{\frac{24}{7}}$$

14.  $\sin(\pi - x) = \sin x$

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

$$0 \cdot \cos x - (-1) \cdot \sin x$$

$$\sin x \checkmark \text{ :)$$

15.  $\sin(\frac{3\pi}{2} + x) = -\cos x$

$$\sin\frac{3\pi}{2} \cos x + \cos\frac{3\pi}{2} \sin x$$

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

$$-\cos x \checkmark$$

16.  $\cos(30^\circ - x) + \cos(30^\circ + x) = \sqrt{3} \cos x$

$$\cos 30^\circ \cos x + \sin 30^\circ \sin x + \cos 30^\circ \cos x - \sin 30^\circ \sin x$$

$$\frac{\sqrt{3}}{2} \cos x + \frac{1}{2} \sin x + \frac{\sqrt{3}}{2} \cos x - \frac{1}{2} \sin x$$

$$\sqrt{3} \cos x \checkmark$$

$$17. \frac{\sin(B-a)}{\sin a \sin B} = \cot a - \cot B$$

$$\frac{\sin B \cos a - \cos B \sin a}{\sin a \sin B}$$

$$\frac{\sin B \cos a}{\sin a \sin B} - \frac{\cos B \sin a}{\sin a \sin B}$$

$$\frac{\cos a}{\sin a} - \frac{\cos B}{\sin B}$$

$$\cot a - \cot B \checkmark \ddot{\smile}$$

$$18. \cos(a+b) + \cos(a-b) = 2 \cos a \cos b$$

$$\cos a \cos b - \sin a \sin b + \cos a \cos b + \sin a \sin b = 2 \cos a \cos b \checkmark \ddot{\smile}$$

$$19. \sin\left(x + \frac{\pi}{6}\right) - \sin\left(x - \frac{\pi}{6}\right) = \frac{1}{2}$$

$$\left(\sin x \cos \frac{\pi}{6} + \cos x \sin \frac{\pi}{6}\right) - \left(\sin x \cos \frac{\pi}{6} - \cos x \sin \frac{\pi}{6}\right) = \frac{1}{2}$$

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

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

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

$$20. \tan(x + \pi) + 2 \sin(x + \pi) = 0$$

$$\frac{\tan x + \tan \pi}{1 - \tan x \tan \pi} + 2(\sin x \cos \pi + \cos x \sin \pi) = 0$$

$$\frac{\tan x + 0}{1 - \tan x \cdot 0} + 2(\sin x \cdot -1 + \cos x \cdot 0) = 0$$

$$\tan x + 2 \sin x = 0$$

$$\frac{\sin x}{\cos x} - 2 \sin x = 0$$

$$\cos x$$

$$\sin x \left( \frac{1}{\cos x} - 2 \right) = 0$$

$$\sin x = 0$$

$$x = 0, \pi$$

$$\frac{1}{\cos x} - 2 = 0$$

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

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

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

$$21. \sin\left(x + \frac{\pi}{2}\right) - \cos\left(x + \frac{3\pi}{2}\right) = 0$$

$$\left(\sin x \cos \frac{\pi}{2} + \cos x \sin \frac{\pi}{2}\right) - \left(\cos x \cos \frac{3\pi}{2} - \sin x \sin \frac{3\pi}{2}\right) = 0$$

$$\left(\cancel{\sin x \cdot 0} + \cos x \cdot 1\right) - \left(\cancel{\cos x \cdot 0} - \sin x \cdot -1\right) = 0$$

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

$$\cos x = \sin x$$

$$x = \frac{\pi}{4}, \frac{5\pi}{4}$$