

Where did I go wrong? Find the part of the problem that I did incorrectly and circle it with a colored pen/pencil/marker (this means no blue/black). Then describe what I should have done instead.

1. $\cos 15^\circ$

$$\begin{aligned} & \cos(45-30) \\ & \cos 45 \cos 30 + \sin 45 \sin 30 \\ & \frac{\sqrt{2}}{2} \cdot \frac{1}{2} + \frac{\sqrt{2}}{2} \cdot \frac{1}{2} \\ & \frac{\sqrt{2}}{4} + \frac{\sqrt{2}}{4} \\ & \frac{2\sqrt{2}}{4} = \boxed{\frac{\sqrt{2}}{2}} \end{aligned}$$

2. $\sin \frac{7\pi}{12}$

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

3. $\tan(60 + 45) = \frac{\tan 60 + \tan 45}{1 - \tan 60 \tan 45}$

$$\begin{aligned} & \frac{\sqrt{3}+1}{1-\sqrt{3}(1)} \\ & \frac{\sqrt{3}+1}{1-\sqrt{3}} \cdot \frac{(1+\sqrt{3})}{(1+\sqrt{3})} \\ & \frac{\sqrt{3}-3+1-\sqrt{3}}{1-\sqrt{3}-\sqrt{3}+3} \\ & \frac{-2}{4-2\sqrt{3}} \cdot \frac{(\sqrt{3})}{(\sqrt{3})} \end{aligned}$$

$$\begin{aligned} & \frac{-2\sqrt{3}}{4-2 \cdot 3} \\ & \frac{-2\sqrt{3}}{4-6} \\ & \frac{-2\sqrt{3}}{-2} = \boxed{\sqrt{3}} \end{aligned}$$

Use for #4 - #6

$\sin x = \frac{-7}{25}; \quad \pi < x < \frac{3\pi}{2}$

$\cos y = \frac{-4}{5}; \quad \pi < y < \frac{3\pi}{2}$

4. $\sin(x - y)$

$$\begin{aligned} & \sin x \cos y - \cos x \sin y \\ & \frac{-7}{25} \cdot \frac{-4}{5} - \frac{24}{25} \cdot \frac{-7}{25} \\ & = \boxed{\frac{308}{625}} \end{aligned}$$

5. $\cos(x - y)$

$$\begin{aligned} & \cos x \cos y + \sin x \sin y \\ & \frac{-24}{25} \cdot \frac{-4}{5} + \frac{-7}{25} \cdot \frac{-3}{5} \\ & = \boxed{\frac{3}{5}} \end{aligned}$$

$$\sin x = \frac{-7}{25}; \quad \pi < x < \frac{3\pi}{2}$$

$$\cos y = \frac{-4}{5}; \quad \pi < y < \frac{3\pi}{2}$$

6. $\tan(x - y)$

$$\frac{\tan x - \tan y}{1 + \tan x \tan y}$$

$$\frac{\left(\frac{-7}{25}\right)\left(\frac{-3}{5}\right)}{1 + \left(\frac{-7}{25}\right)\left(\frac{-3}{5}\right)}$$

$$= \boxed{\frac{21}{146}}$$

Simplify

7. $\cos(\pi - x) + \sin\left(\frac{\pi}{2} + x\right)$

$$\cos(180 - x) + \sin(90 + x)$$

$$\cos 180 \cos x + \sin 180 \sin x + \sin 90 \cos x + \cos 90 \sin x$$

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

$$= \boxed{\cos x}$$

8. $\sin(x + y) + \sin(x - y)$

$$(\sin x \cos y + \cos x \sin y) + (\sin x \cos y - \cos x \sin y)$$

$$\sin^2 x \cos^2 y - \cos^2 x \sin^2 y$$

$$\sin^2 x (1 - \sin^2 y) - (1 - \sin^2 x) \sin^2 y$$

$$\sin^2 x - \sin^2 x \sin^2 y - (\sin^2 y - \sin^2 x \sin^2 y)$$

$$\sin^2 x - \cancel{\sin^2 x \sin^2 y} - \sin^2 y + \cancel{\sin^2 x \sin^2 y}$$

$$\boxed{\sin^2 x - \sin^2 y}$$