

270
105

$$\begin{aligned}
 & \sqrt{3} \sin 7x - \sin 5x = \sqrt{3} (\sin 5x - \sin 7x) \\
 & \sqrt{3} \sin 7x - \sqrt{3} \sin \left(\frac{\pi}{2} - 5x\right) = \sqrt{3} (\sin 5x - \sqrt{3} \sin \left(\frac{\pi}{2} - 7x\right)) \\
 & -2 \sin \left(x + \frac{\pi}{4}\right) \sin \left(6x - \frac{\pi}{4}\right) = -2\sqrt{3} \sin \left(-x + \frac{\pi}{4}\right) \sin \left(6x - \frac{\pi}{4}\right) \\
 & -2 \sin \left(6x - \frac{\pi}{4}\right) \left[\sin \left(x + \frac{\pi}{4}\right) + \sqrt{3} \sin \left(-x + \frac{\pi}{4}\right) \right] = 0 \\
 & 6x - \frac{\pi}{4} = \pi k \quad \frac{\sqrt{2}}{2} \sin x + \frac{\sqrt{2}}{2} \cos x + \frac{\sqrt{2}\sqrt{3}}{2} \sin x - \frac{\sqrt{3}\sqrt{2}}{2} \cos x = 0 \\
 & \boxed{x = \frac{\pi}{24} + \frac{\pi k}{6}} \quad \sin x \left(\frac{\sqrt{2+\sqrt{6}}}{2}\right) + \cos x \left(\frac{\sqrt{2-\sqrt{6}}}{2}\right) = 0
 \end{aligned}$$

$$\sin x \left(\frac{\sqrt{2+\sqrt{6}}}{2}\right) = -\cos x \left(\frac{\sqrt{2-\sqrt{6}}}{2}\right) / : \cos x \neq 0$$

$$\tan x = -\frac{\frac{\sqrt{2+\sqrt{6}}}{2}}{\frac{\sqrt{2-\sqrt{6}}}{2}} = -\frac{\sqrt{2+\sqrt{6}}}{\sqrt{2-\sqrt{6}}} \cdot \frac{\sqrt{2+\sqrt{6}}}{\sqrt{2+\sqrt{6}}}$$

$$\tan x = \frac{2 + 2\sqrt{12} + 6}{4} = \frac{-4 + \sqrt{12}}{2} = 2 + \sqrt{3}$$

$$x = \frac{\pi}{12} + \pi k$$