

2.62  
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$$\begin{aligned}2\sqrt{3}\sin 2x \cos x + 4\sin x \cos^2 x &= 3\sin^2 x - \cos^2 x \\4\sqrt{3}\sin^2 x \cos x + 4\sin x \cos^2 x &= (\sqrt{3}\sin x - \cos x)(\sqrt{3}\cos x + \cos x) \\4\sin x \cos x(\sqrt{3}\sin x + \cos x) &= (\sqrt{3}\sin x - \cos x)(\sqrt{3}\cos x + \cos x)\end{aligned}$$

$$\begin{aligned}\sqrt{3}\sin x + \cos x &= 0 \\ \tan x &= -\frac{1}{\sqrt{3}} \\ \boxed{x = -\frac{\pi}{6} + 2k\pi}\end{aligned}$$

$$\begin{aligned}4\sin x \cos x &= \sqrt{3}\sin x - \cos x \\ 2\sin 2x &= \sqrt{3}\sin x - \cos x \quad | : 2 \\ \sin 2x &= \frac{\sqrt{3}}{2}\sin x - \frac{1}{2}\cos x \\ \sin 2x &= \cos \beta \sin x - \sin \beta \cos x \\ \sin 2x &= \sin(x - \beta) \\ 2x &= x - \frac{\pi}{6} + 2k\pi & 2x &= \pi - x + \frac{\pi}{6} + 2k\pi \\ x &= -\frac{\pi}{6} + 2k\pi & \boxed{x = \frac{7\pi}{6} + \frac{2k\pi}{3}}\end{aligned}$$