



$$\sin\left(\frac{\pi}{4} + x - \frac{\pi}{4}\right) \cos\left(x - \frac{\pi}{4}\right) = 1 \rightarrow \cos^2\left(x - \frac{\pi}{4}\right) = 1$$

$$\rightarrow \cos\left(x - \frac{\pi}{4}\right) = \pm 1 \rightarrow \text{Unit Circle} \rightarrow x = \left\{0, \frac{\pi}{4}, \pi, \frac{5\pi}{4}, 2\pi, \frac{7\pi}{4}\right\} \Rightarrow \text{Answer}$$

$$\frac{1}{\sqrt{2}} \sin x + \frac{\sqrt{2}}{2} \cos x = \frac{\sqrt{2}}{2} \rightarrow \sin^2 x + \cos^2 x = \frac{\sqrt{2}}{2} = \cos\left(x - \frac{\pi}{4}\right)$$

$$\rightarrow x - \frac{\pi}{4} = 2k\pi \pm \frac{\pi}{2} \rightarrow x = 2k\pi + \frac{\pi}{2} + \frac{\pi}{4} = 2k\pi + \frac{3\pi}{4} \rightarrow \frac{3\pi}{4}, \frac{7\pi}{4}, \frac{11\pi}{4}, \frac{15\pi}{4}$$

$$\rightarrow x = 2k\pi - \frac{\pi}{2} + \frac{\pi}{4} = 2k\pi - \frac{\pi}{4} \rightarrow \frac{7\pi}{4}, \frac{5\pi}{4}, \frac{3\pi}{4}, \frac{1\pi}{4}$$

$$\frac{3\pi}{4} + 2\pi - \frac{5\pi}{4} = 2\pi + \frac{\pi}{2}$$

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

$$2x = 2k\pi - \frac{\pi}{4} \rightarrow x = k\pi - \frac{\pi}{8} \rightarrow \frac{7\pi}{8}, \frac{11\pi}{8}, \frac{15\pi}{8}, \frac{19\pi}{8}$$

$$2x = 2k\pi + \frac{3\pi}{4} \rightarrow x = k\pi + \frac{3\pi}{8} \rightarrow \frac{3\pi}{8}, \frac{7\pi}{8}, \frac{11\pi}{8}, \frac{15\pi}{8}$$

$$(1 - \cos 2x)(1 + \cos 2x) = 1 - \cos^2 2x = 1 - \frac{\cos 4x + 1}{2} = \frac{1 - \cos 4x}{2}$$

$$\rightarrow A \times \frac{(1 - \cos 2x)}{(1 - \cos 4x)} = \frac{1}{A} \times \frac{(1 - \cos 4x)}{(1 - \cos 4x)} = \frac{1}{A} \rightarrow \cos 4x = \cos 2x$$

$4x = 2k\pi + 2x$   
 $4x = 2k\pi - 2x$

$$\rightarrow x = \frac{2k\pi}{3}, \cos 2x \neq 0 \rightarrow A = \frac{1}{3}$$

$$\tan 2x = \tan\left(\frac{\pi}{4} - x\right) \rightarrow a = k\pi + b \rightarrow 2x = k\pi + \frac{\pi}{4} - x \rightarrow 3x = k\pi + \frac{\pi}{4} \rightarrow x = \frac{k\pi}{3} + \frac{\pi}{12}$$

$$\rightarrow \frac{\pi}{12} + \frac{5\pi}{12} + \frac{9\pi}{12} + \frac{13\pi}{12} = \frac{24\pi}{12} = 2\pi$$