

(1) لكل  $x \in \mathbb{R}$  :

$$\begin{aligned} \sin\left(x + \frac{\pi}{3}\right) + \cos\left(x + \frac{\pi}{6}\right) &= \left(\sin x \cos \frac{\pi}{3} + \cos x \sin \frac{\pi}{3}\right) + \left(\cos x \cos \frac{\pi}{6} - \sin x \sin \frac{\pi}{6}\right) \\ &= \frac{1}{2} \sin x + \frac{\sqrt{3}}{2} \cos x + \frac{\sqrt{3}}{2} \cos x - \frac{1}{2} \sin x \\ &= \sqrt{3} \cos x \end{aligned}$$

(2) من خلال السؤال (1) :

$$\text{نكتب : } \sin\left(2x + \frac{\pi}{3}\right) + \cos\left(2x + \frac{\pi}{3}\right) = \sqrt{3} \cos 2x$$

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

$$\sqrt{3} \cos 2x + \sin 2x = 1 : \text{ يعني أن}$$

$$\frac{\sqrt{3}}{2} \cos 2x + \frac{1}{2} \sin 2x = \frac{1}{2} : \text{ يعني أن}$$

$$\sin\left(2x + \frac{\pi}{3}\right) = \frac{1}{2} : \text{ يعني أن}$$

$$\Leftrightarrow \begin{cases} 2x + \frac{\pi}{3} = \frac{\pi}{6} + 2k\pi; k \in \mathbb{Z} \\ 2x + \frac{\pi}{3} = \frac{5\pi}{6} + 2k\pi; k \in \mathbb{Z} \end{cases} : \text{ يعني}$$

$$\text{أي أن : } x = -\frac{\pi}{12} + k\pi \text{ أو } x = \frac{\pi}{4} + k\pi \text{ حيث } k \in \mathbb{Z}$$

$$S = \left\{-\frac{\pi}{12} + k\pi; k \in \mathbb{Z}\right\} \cup \left\{\frac{\pi}{4} + k\pi; k \in \mathbb{Z}\right\} : \text{ وبالتالي فإن مجموعة حلول المعادلة هي}$$