

6). $\sin x \cos x = 6(\sin x - \cos x) - 1. (1)$

Đặt $t = \sin x - \cos x$ (ĐK: $|t| \leq \sqrt{2}$) $\Rightarrow t^2 = (\sin x - \cos x)^2 \Rightarrow \sin x \cos x = \frac{1-t^2}{2}$

(1): $\frac{1-t^2}{2} = 6t - 1 \Leftrightarrow t^2 + 12t - 3 = 0 \Leftrightarrow t = -6 + \sqrt{39} \vee t = -6 - \sqrt{39}$ (loại).

Với $t = -6 + \sqrt{39} \Leftrightarrow \sqrt{2} \sin\left(x - \frac{\pi}{4}\right) = -6 + \sqrt{39} \Leftrightarrow \sin\left(x - \frac{\pi}{4}\right) = \frac{-6 + \sqrt{39}}{\sqrt{2}}$

$$\Leftrightarrow \begin{cases} x - \frac{\pi}{4} = \arcsin\left(\frac{-6 + \sqrt{39}}{\sqrt{2}}\right) + k2\pi \\ x - \frac{\pi}{4} = \pi - \arcsin\left(\frac{-6 - \sqrt{39}}{\sqrt{2}}\right) + k2\pi \end{cases} \Leftrightarrow \begin{cases} x = \frac{\pi}{4} + \arcsin\left(\frac{-6 + \sqrt{39}}{\sqrt{2}}\right) + k2\pi \\ x = \frac{5\pi}{4} - \arcsin\left(\frac{-6 - \sqrt{39}}{\sqrt{2}}\right) + k2\pi \end{cases}$$

Nghiệm của phương trình:

$$x = \frac{\pi}{4} + \arcsin\left(\frac{-6 + \sqrt{39}}{\sqrt{2}}\right) + k2\pi, x = \frac{5\pi}{4} - \arcsin\left(\frac{-6 - \sqrt{39}}{\sqrt{2}}\right) + k2\pi, (k \in \mathbb{Z})$$

7). $\sin x - \cos x = 2\sqrt{6} \sin x \cos x. (1)$

Đặt $t = \sin x - \cos x$ (ĐK: $|t| \leq \sqrt{2}$) $\Leftrightarrow t^2 = (\sin x - \cos x)^2 \Leftrightarrow \sin x \cos x = \frac{1-t^2}{2}$

(1) $\Leftrightarrow t = 2\sqrt{6} \frac{1-t^2}{2} \Leftrightarrow \sqrt{6}t^2 + t - \sqrt{6} = 0 \Leftrightarrow t = \frac{\sqrt{6}}{3} \vee t = -\frac{\sqrt{6}}{2}$

Với $t = \frac{\sqrt{6}}{3} \Leftrightarrow \sqrt{2} \sin\left(x - \frac{\pi}{4}\right) = \frac{\sqrt{6}}{3} \Leftrightarrow \sin\left(x - \frac{\pi}{4}\right) = \frac{\sqrt{3}}{3}$

$$\Leftrightarrow \begin{cases} x - \frac{\pi}{4} = \arcsin\left(\frac{\sqrt{3}}{3}\right) + k2\pi \\ x - \frac{\pi}{4} = \pi - \arcsin\left(\frac{\sqrt{3}}{3}\right) + k2\pi \end{cases} \Leftrightarrow \begin{cases} x = \frac{\pi}{4} + \arcsin\left(\frac{\sqrt{3}}{3}\right) + k2\pi \\ x = \frac{5\pi}{4} - \arcsin\left(\frac{\sqrt{3}}{3}\right) + k2\pi \end{cases}$$

Với $t = -\frac{\sqrt{6}}{2} \Leftrightarrow \sqrt{2} \sin\left(x - \frac{\pi}{4}\right) = -\frac{\sqrt{6}}{2} \Leftrightarrow \sin\left(x - \frac{\pi}{4}\right) = -\frac{\sqrt{3}}{2}$

$$\Leftrightarrow \begin{cases} x - \frac{\pi}{4} = -\frac{\pi}{3} + k2\pi \\ x - \frac{\pi}{4} = \pi + \frac{\pi}{3} + k2\pi \end{cases} \Leftrightarrow \begin{cases} x = -\frac{\pi}{12} + k2\pi \\ x = \frac{19\pi}{12} + k2\pi \end{cases} (k \in \mathbb{Z}).$$

Nghiệm của phương trình: $x = -\frac{\pi}{12} + k2\pi, x = \frac{19\pi}{12} + k2\pi,$

$$(k \in \mathbb{Z}) x = \frac{\pi}{4} + \arcsin\left(\frac{\sqrt{3}}{3}\right) + k2\pi, x = \frac{5\pi}{4} - \arcsin\left(\frac{\sqrt{3}}{3}\right) + k2\pi, (k \in \mathbb{Z})$$

8). $2\sqrt{2}(\sin x - \cos x) = 3 - \sin 2x.$

Đặt $t = \sin x - \cos x$ (ĐK: $|t| \leq \sqrt{2}$) $\Leftrightarrow t^2 = (\sin x - \cos x)^2 \Leftrightarrow \sin 2x = 1 - t^2$

Ta được: $2\sqrt{2}t = 3 - (1 - t^2) \Leftrightarrow t^2 - 2\sqrt{2}t + 2 = 0 \Leftrightarrow t = \sqrt{2} \Leftrightarrow \sqrt{2} \sin\left(x - \frac{\pi}{4}\right) = \sqrt{2}$

$$\Leftrightarrow \sin\left(x - \frac{\pi}{4}\right) = 1 \Leftrightarrow x - \frac{\pi}{4} = \frac{\pi}{2} + k2\pi \Leftrightarrow x = \frac{3\pi}{4} + k2\pi \quad (k \in \mathbb{Z})$$

Nghiệm của phương trình: $x = \frac{3\pi}{4} + k2\pi \quad (k \in \mathbb{Z})$

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