

الف) $\cos 2x = 3 \sin x - 1 \rightarrow 3 \sin^2 x + 3 \sin x - 2 = 0$ $\sin x = -\frac{2}{3}$, $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\sin x = \frac{1}{3}$ $x = \begin{cases} 2k\pi + \frac{\pi}{3} \\ 2k\pi + \frac{2\pi}{3} \end{cases}$

ب) $\cos 2x + \cos x - 2 = 0 \rightarrow 2 \cos^2 x + \cos x - 2 = 0$ $\cos x = -\frac{2}{3}$, $\frac{1}{3}$ $\frac{1}{3}$ $\frac{1}{3}$

$\cos x = 1$ $x = 2k\pi$

الف) $\sin^2 x - \cos^2 x = \sin 2x \rightarrow \cos 2x = -\sin 2x = \sin -2x$

$\cos 2x = \cos \left(\frac{\pi}{2} + 2x \right)$ $2x + \frac{\pi}{2} = 2k\pi \pm 2x$

$2x = 2k\pi - \frac{\pi}{2}$ $2x = 2k\pi + \frac{\pi}{2}$ $x = \begin{cases} k\pi - \frac{\pi}{4} \\ k\pi + \frac{\pi}{4} \end{cases}$

ب) $2 \cos^2 x + 2 \sin x \cos x = 1$ $\sin 2x = -\cos 2x \rightarrow \tan 2x = -1$ $2x = k\pi - \frac{\pi}{4}$ $x = \frac{k\pi}{2} - \frac{\pi}{8}$

الف) $\cot x (2 \cos x + 1) = \frac{1}{\sin x} \rightarrow \frac{\cos x}{\sin x} (2 \cos x + 1) = \frac{1}{\sin x}$

$2 \cos^2 x + \cos x = 1 \rightarrow \cos 2x = -\cos x \rightarrow \cos 2x = \cos (\pi - x)$

$2x = 2k\pi \pm (\pi - x) \rightarrow x = \begin{cases} 2k\pi - \pi \\ \frac{2k\pi}{3} + \frac{\pi}{3} \end{cases}$

ب) $2 \sin^2 x - \sin x \cos x + \cos^2 x = 2 \rightarrow 2 - \cot^2 x + \cot x = 2(1 + \cot^2 x)$

$\cot^2 x + \cot x = 0 \rightarrow \cot x (\cot x + 1) = 0 \rightarrow \cot x = 0, -1$ $x = \begin{cases} k\pi + \frac{\pi}{2} \\ k\pi - \frac{\pi}{4} \end{cases}$

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

$\frac{1}{2} \sin \left(2x + \frac{\pi}{2} \right) = \frac{1}{2} \rightarrow \cos 2x = \frac{1}{2}$ $2x = 2k\pi \pm \frac{\pi}{3}$

$x = k\pi \pm \frac{\pi}{6}$

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

$2x - \frac{\pi}{4} = 2k\pi \pm \left(2x + \frac{\pi}{4} \right) \rightarrow x = \frac{k\pi}{2} + \frac{\pi}{4} - \frac{\pi}{4} \rightarrow x = \frac{k\pi}{2}$

$\frac{\sin 2x + \sin 4x}{\sin x} = \sin^2 x = \cos^2 x \rightarrow \frac{\sin 2x + \sin 4x}{\sin x} = 1$

$\sin 2x + \sin 4x = \sin x \rightarrow \sin^2 x = 0 \rightarrow \sin x = 0$ $\sin 2x = 2 \sin x \cos x$

$\sin x \neq 0 \rightarrow \cos 2x = 0 \rightarrow 2x = k\pi + \frac{\pi}{2} \rightarrow x = \frac{k\pi}{2} + \frac{\pi}{4}$

$$\frac{\sin \frac{x}{r}}{1 + \cos \frac{x}{r}} = \frac{1}{\sin \frac{x}{r}} + \cot \frac{x}{r} \rightarrow \tan \frac{x}{r} = \frac{1 + \cos \frac{x}{r}}{\sin \frac{x}{r}} \cdot \cot \frac{x}{r}$$

$$\tan \frac{x}{r} = 1 \rightarrow \frac{x}{r} = K\pi \pm \frac{\pi}{r} \rightarrow x = rK\pi \pm \pi$$

$$x_1 = -\pi \rightarrow |x_2 - x_1| = 2\pi$$

$$x_2 = +\pi$$

6

$$\cos^r x - \sin^r x \cos rx = 1 \rightarrow -\sin^r x \cos rx = 1 - \cos^r x$$

$$-\sin^r x \cos rx = \sin^r x \rightarrow \cos rx = -1, \sin^r x = 0$$

$$rx = rK\pi + \pi \rightarrow x = \frac{rK\pi}{r} + \frac{\pi}{r} \rightarrow x = \frac{\pi}{r}, \pi, \frac{3\pi}{r}$$

$$\sin rx = 0 \rightarrow x = K\pi \rightarrow x = 0, \pi, 2\pi$$

... و ...

7

$$\frac{1 - \tan x}{1 + \tan x} = \tan rx \rightarrow \tan \left(\frac{\pi}{r} - x \right) = \tan rx$$

$$rx = K\pi + \frac{\pi}{r} - x \rightarrow rx = K\pi + \frac{\pi}{r} \rightarrow x = \frac{K\pi}{r} + \frac{\pi}{1r}$$

8

$$\sqrt{1 + \sin rx} = \sqrt{r} \cos rx \rightarrow 1 + \sin rx = r \cos^2 rx \rightarrow \sin rx = r(\cos^2 rx - 1)$$

$$\sin rx = \cos rx \rightarrow \sin rx = 1 - r \sin^2 rx \rightarrow r \sin^2 rx + \sin rx - 1 = 0$$

$$\sin rx = \frac{1}{r}, -1$$

$$rx = rK\pi + \frac{\pi}{r}$$

$$= rK\pi + \frac{\pi}{r}$$

$$rx = rK\pi + \frac{r\pi}{r}$$

$$\cos rx \geq 0 \rightarrow x \rightarrow \frac{\pi}{1r}, \frac{\partial \pi}{\partial \partial}, \frac{r\pi}{\partial \partial} \rightarrow \dots$$

$$x \begin{cases} K\pi + \frac{\pi}{r} \\ K\pi + \frac{\partial \pi}{\partial \partial} \\ K\pi + \frac{r\pi}{r} \end{cases}$$

9

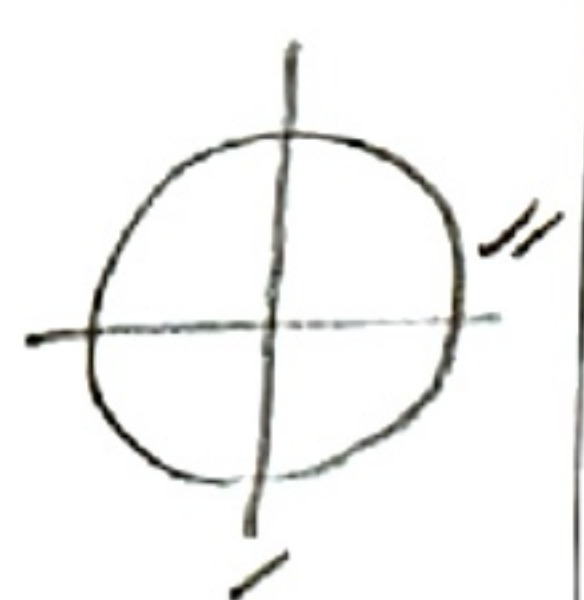
$$\text{الف) } \cos rx = -1 \rightarrow rx = rK\pi + \pi \rightarrow x = K\pi + \frac{\pi}{r}$$

$$x = +\frac{\pi}{r}, +\frac{r\pi}{r}$$

... و ...

$$\text{ب) } \sin rx - \cos rx = -1$$

$$\dots x = 0, 2\pi, \frac{r\pi}{r}$$



10