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الف) $1-2\sin^2 x = 3\sin x - 1$

$2\sin^2 x + 3\sin x - 2 = 0$

$\Rightarrow \sin x = \frac{1}{2}$

$\Rightarrow x = 2k\pi + \frac{\pi}{6}$

یا $(2k+1)\pi - \frac{\pi}{6}$

ب) $2\cos^2 x - 1 + \cos x - 2 = 0$

$2\cos^2 x + \cos x - 3 = 0$

$\cos x = 1$

$\Rightarrow x = 2k\pi$

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الف) $\sin^4 x - \cos^4 x = (\sin^2 x + \cos^2 x)(\sin^2 x - \cos^2 x)$

$= -\cos 2x = \sin 4x$

$\Rightarrow -\cos 2x = 2\sin 2x \cos 2x$

$\Rightarrow \sin 2x = -\frac{1}{2} = \sin -\frac{\pi}{6}$

$2x = 2k\pi - \frac{\pi}{6} \rightsquigarrow x = k\pi - \frac{\pi}{12}$

$2x = (2k+1)\pi + \frac{\pi}{6} \rightsquigarrow x = \frac{(2k+1)}{2}\pi + \frac{\pi}{12}$

ب) $2\cos^2 x + 2\sin x\cos x = 1$

$1 + \cos 2x + \sin 2x = 1$

$\Rightarrow \cos 2x + \sin 2x = 0$

$\xRightarrow{\div \cos 2x} 1 + \tan 2x = 0 \Rightarrow \tan 2x = -1 = \tan -\frac{\pi}{4}$

$\Rightarrow 2x = k\pi - \frac{\pi}{4} \Rightarrow x = \frac{k\pi}{2} - \frac{\pi}{8}$

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

$\xRightarrow{\sin x \neq 0} 2\cos^2 x + \cos x = 1$

$\Rightarrow \cos x = \frac{1}{2}$

$\Rightarrow x = 2k\pi \pm \frac{\pi}{6}$

ب) $2\sin^2 x - \sin x\cos x + \cos^2 x - 2 = 0$

$2(\sin^2 x - 1) - \sin x\cos x + \cos^2 x = 0$

$-2\cos^2 x - \sin x\cos x + \cos^2 x = 0$

$-\cos^2 x - \sin x\cos x = 0$

$\xRightarrow{\div \cos^2 x} -1 - \tan x = 0 \Rightarrow \tan x = -1$

$x = k\pi + \frac{\pi}{4}$

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ب) $\cos(2x - \frac{\pi}{9}) = \sin x = \cos(\frac{\pi}{2} - x)$

$\Rightarrow 2x - \frac{\pi}{9} = 2k\pi \pm (\frac{\pi}{2} - x)$

$\Rightarrow x = \frac{k\pi}{2} - \frac{7\pi}{72}$

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

$\Rightarrow \frac{2\sin 2x\cos 2x + \sin 2x}{\sin 2x} = \sin^2 x + \cos^2 x$

$2\cos 2x + 1 = 1 \Rightarrow \cos 2x = 0 = \cos\frac{\pi}{2} \Rightarrow 2x = 2k\pi \pm \frac{\pi}{2}$

$x = k\pi \pm \frac{\pi}{4}$

$\frac{\sin\frac{x}{2}}{1+\cos\frac{x}{2}} = \frac{1}{\sin\frac{x}{2}} + \frac{\cos\frac{x}{2}}{\sin\frac{x}{2}} \Rightarrow \tan\frac{x}{4} = \cot\frac{x}{4}$ $\frac{x}{4}+\frac{x}{4} = \frac{k\pi}{2}+\frac{\pi}{4}$ $\Rightarrow x = k\pi + \frac{\pi}{2}$ $-\pi \le x \le \frac{3\pi}{2} \Rightarrow k = -1, 0, 1 \Rightarrow$ ۳ جواب $\left\|\frac{3\pi}{2} - \frac{\pi}{2}\right\| = \pi \quad \left\|\frac{3\pi}{2} - (-\frac{\pi}{2})\right\| = 2\pi$	۶
$\cos^2 x - \sin^2 x \cos 3x = 1$ $\div \sin^2 x \Rightarrow \cot^2 x - \cos 3x = \frac{1}{\sin^2 x}$ $\Rightarrow \cot^2 x - \cos 3x = 1 + \cot^2 x$ $\Rightarrow \cos 3x = -1 = \cos(-\pi) \Rightarrow 3x = 2k\pi \pm \pi$ $\Rightarrow x = \frac{2k\pi \pm \pi}{3}$ $0 \le x \le 2\pi \Rightarrow$ ۳ جواب	۷
$\frac{1-\tan x}{1+\tan x} = \tan 3x$ $\Rightarrow \frac{\tan\frac{\pi}{4} - \tan x}{1+\tan\frac{\pi}{4}\times\tan x} = \tan 3x$ $\tan(\frac{\pi}{4} - x) = \tan 3x$ $3x = k\pi + \frac{\pi}{4} - x$ $\Rightarrow x = \frac{k\pi}{4} + \frac{\pi}{16}$	۸
$1+\sin 2x = 2\cos^2 2x \Rightarrow \sin 2x = 2\cos^2 2x - 1 = \cos 4x$ $= \cos(\frac{\pi}{2} - 2x)$ $\Rightarrow 4x = 2k\pi \pm (\frac{\pi}{2} - 2x) \Rightarrow x = \frac{k\pi}{3} + \frac{\pi}{12}$ یا $x = k\pi - \frac{\pi}{4}$ $0 \le x \le \pi \Rightarrow$ ۳ جواب	۹
الف) $\sin^4 x - \cos^4 x = 1$ $x = 0$ یا 2π ✗ $x = \frac{\pi}{2}$ ✓ $x = \pi$ ✗ $x = \frac{3\pi}{2}$ ✓ ب) $\sin^3 x - \cos^3 x = -1$ $x = 0$ یا 2π ✓ $x = \frac{\pi}{2}$ ✗ $x = \pi$ ✗ $x = \frac{3\pi}{2}$ ✓	۱۰