Q find number of solutions in $[0, 2\pi]$

Good

$$\tan(5\pi\cos x) = \cot(5\pi\sin x)$$

$$\tan(5\pi\cos x) = \frac{1}{\tan(5\pi\sin x)}$$

$$\tan(\underbrace{5\pi\cos x}_{A})\tan(\underbrace{5\pi\sin x}_{B}) = 1$$

$$\tan A \tan B = 1$$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

if $\tan A \tan B = 1$

$\tan(A+B) =$ not defined

$A+B = \pi/2$ [in complete sol^n]

$A + B = (2n-1)\pi/2$

$n \in I$

$A = 5\pi\cos x \qquad B = 5\pi\sin x$

$$5\pi\cos x + 5\pi\sin x = (2n-1)\frac{\pi}{2}$$

$$\cos x + \sin x = (2n-1)\frac{1}{10}$$

$$a\cos x + b\sin x = c$$

$$|c| \le \sqrt{a^2+b^2}$$

$a = 1 \qquad b = 1$

$$\sqrt{a^2+b^2} = \sqrt{2} \qquad c = \frac{2n-1}{10}$$

$$\left|\frac{2n-1}{10}\right| \le \sqrt{2}$$

$n \in I$

$$-\sqrt{2} \le \frac{2n-1}{10} \le \sqrt{2}$$

$$-10\sqrt{2} \le 2n-1 \le 10\sqrt{2}$$

$$-14.14 \le 2n-1 \le 14.14$$

$$-13.14 \le 2n \le 15.14$$

$$-6.57 \le n \le 7.57$$

$n = -6, -5 \ldots 7$

$a, b \rightarrow b-a+1$

$7-(-6)+1$

14 Integers

n Valu

if $n=1$

$$\cos x + \sin x = \frac{2n-1}{10} = \frac{1}{10}$$

$$\sqrt{a^2+b^2} = \sqrt{2}$$

$$\underbrace{\frac{1}{\sqrt{2}}}_{\cos\pi/4} \cos x + \underbrace{\frac{1}{\sqrt{2}}}_{\sin\pi/4} \sin x = \frac{1}{10\sqrt{2}}$$

$$\cos(x - \pi/4) = \frac{1}{10\sqrt{2}}$$

2 solutions

$x \in [0, 2\pi]$

$x - \pi/4 \in \left[-\frac{\pi}{4}, \frac{7\pi}{4}\right]$

complete 1 cycle of 2π

For one value of $n \longrightarrow$ 2 solutions

we have 14 values of 'n'

so for 14 values of n, number of solution $= 14 \times 2 =$ 28 solutions

TYPE #5 USING SUBSTITUTION.

$$\sin x + \cos x = t$$

$$\underbrace{\sin^2 x + \cos^2 x} + \underbrace{2\sin x\cos x} = t^2$$

$$1 + \sin 2x = t^2$$

$$\sin 2x = t^2 - 1$$

$$\sin x - \cos x = t$$

$$\underbrace{\sin^2 x + \cos^2 x} - 2\sin x\cos x = t^2$$

$$1 - \sin 2x = t^2$$

$$\sin 2x = 1 - t^2$$

Q $\sin 2x + 5\sin x + 1 + 5\cos x = 0$

$\sin 2x + 1 + 5(\underline{\sin x + \cos x}) = 0$

$\sin x + \cos x = t$

$1 + \sin 2x = t^2$

$\sin 2x = t^2 - 1$

$t^2 - \cancel{1} + \cancel{1} + 5t = 0$

$t^2 + 5t = 0$

$t = 0, -5$

$\sin x + \cos x = -5$

$\sqrt{a^2+b^2} = \sqrt{2}$ $\quad |c| > \sqrt{a^2+b^2}$ no solution

$\sin x + \cos x = 0$

$\sin x = -\cos x$

$\tan x = -1$

$-\pi/4$

$x = n\pi - \frac{\pi}{4}$

$n \in I$

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

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

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

$\sin x + \cos x = t$

$1 + \sin 2x = t^2$

$\sin 2x = t^2 - 1$

$t = 1 + \frac{t^2 - 1}{2}$

$2t = 2 + t^2 - 1$

$(t-1)^2=0$

$t=1$

$\sin x+\cos x=1$

$\sqrt{a^2+b^2}=\sqrt{2}$

$\underbrace{\frac{1}{\sqrt{2}}}_{\sin\pi/4}\sin x+\underbrace{\frac{1}{\sqrt{2}}}_{\cos\pi/4}\cos x=\frac{1}{\sqrt{2}}$

$\cos(x-\pi/4)=\frac{1}{\sqrt{2}}$

$x-\frac{\pi}{4}=2n\pi\pm\pi/4$

(1) $x-\pi/4=2n\pi+\frac{\pi}{4}$

$x=2n\pi+\frac{\pi}{2}$

(2) $x-\cancel{\frac{\pi}{4}}=2n\pi-\cancel{\pi/4}$

$x=2n\pi$

$n\in I$

M II

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

$$1 - \sin x - \cos x + \sin x \cos x = 0$$

$$(1 - \sin x) - \cos x\,(1 - \sin x) = 0$$

$$(1 - \cos x)(1 - \sin x) = 0$$

$\cos x = 1$ or $\sin x = 1$

$x = 2n\pi$

$x = n\pi + (-1)^n \frac{\pi}{2}$

$n \in I$

$x = 2n\pi + \frac{\pi}{2}$

Q $\sin^4 2x + \cos^4 2x = \sin 2x \cdot \cos 2x$

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

$$1 - 2\sin^2 2x \cos^2 2x = \sin 2x \cos 2x$$

$$\sin 2x \cos 2x = t$$

$$1 - 2t^2 = t \longrightarrow 2t^2 + t - 1 = 0$$

$$2t^2 + 2t - t - 1 = 0$$

$$(2t-1)(t+1) = 0$$

$t = \frac{1}{2} \quad t = -1$

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

$\underline{2 \sin 2x \cos 2x = 1}$

$\sin 4x = 1$

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

$x = \frac{n\pi}{4} + (-1)^n \frac{\pi}{8}$ //

$n \in I$

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

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

$\underbrace{\sin 4x = -2}$

Rejected

HOMEWORK CLASS #2

BB#6	4, 7
BB#7	1, 2, 5
Ex#1	23, 24, 27
Ex#2	12, 14
Ex 4A	3, 12
Ex 4B	4, 7, 11, 16
Ex#5	3

WORKSHEET #2