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1. Common लेकर देखा ?
2. Factorise तो नहीं हो रहा ?
3. Equation को quadratic मे बदल सकते हैं क्या ?
4. AA टाइप तो नहीं है ?
5. Sum या Difference वाला Trigo formula तो नहीं लग रहा ?
6. शायद Product का formula लग रहा होगा !!
7. Change of variable का concept try करा क्या ?
8. Boundedness का Question तो नहीं है न दोस्त ?
9. Equation in (x,y)

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40/30

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$(x+y)$ type.

$x=(2n+1)\frac{\pi}{2} \xrightarrow{n=1} \frac{3\pi}{2}=270^\circ$

$y=\frac{2\pi}{3}-x=\frac{2\pi}{3}-\left(\frac{2n\pi}{2}+\frac{\pi}{2}\right)$

Q Solve $x+y=\frac{\pi}{4}$ & $\tan x+\tan y=1$

$y=-n\pi+\frac{\pi}{6}$

$\tan(x+y)=\tan\frac{\pi}{4}$

$\frac{\tan x+\tan y}{1-\tan x\cdot\tan y}=1$

$\frac{1}{1-\tan x\cdot\tan y}=1$

$\Rightarrow \cancel{1}-\tan x\cdot\tan y=\cancel{1}$

$\Rightarrow \tan x\cdot\tan y=0$

$\tan x=0$ OR $\tan y=0$

$x=n\pi \qquad y=n\pi$

$x+y=\frac{\pi}{4}$ (given)

$n\pi+n\pi=\frac{\pi}{4}$

Integer π + Integer $\pi=\frac{\pi}{4}$

Ho hi nahi sakta.

Not Possible

$(x,y)=\phi$

Q2 $x+y=\frac{2\pi}{3}$ & $\sin x=2\sin y$ find (x,y)?

1) $\sin x=2\sin y$

$\sin x=2\sin\left(\frac{2\pi}{3}-x\right)$

$=2\left\{\sin\frac{2\pi}{3}\cdot\cos x-\cos\frac{2\pi}{3}\cdot\sin x\right\}$

$=2\left\{\frac{\sqrt{3}}{2}\cdot\cos x+\left(+\frac{1}{2}\right)\cdot\sin x\right\}$

$\cancel{\sin x}=\sqrt{3}\cos x+\cancel{\sin x}$

$\sqrt{3}\cos x=0 \Rightarrow x=(2n+1)\frac{\pi}{2}$

2) $x+y=120^\circ$ (given)

$\cancel{90^\circ+30^\circ}=120^\circ \qquad (270,-150)$

$\left((2n+1)\frac{\pi}{2},-n\pi+\frac{\pi}{6}\right)=(x,y)=\left(\frac{\pi}{2},\frac{\pi}{6}\right)$

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Q $\operatorname{cosec}\theta = 1 + \cot\theta$

$$\frac{1}{\sin\theta} = 1 + \frac{\cos\theta}{\sin\theta}$$

$$1 = \sin\theta + \cos\theta \qquad AA = \sqrt{2}$$

$$1 = \sqrt{2}\left(\frac{1}{\sqrt{2}}\sin\theta + \frac{1}{\sqrt{2}}\cos\theta\right)$$

$$\sqrt{2}\left(\cos\left(\theta - \frac{\pi}{4}\right)\right) = 1$$

$$\cos\left(\theta - \frac{\pi}{4}\right) = \frac{1}{\sqrt{2}} = \cos\frac{\pi}{4}$$

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

$\times$ $\theta = 2n\pi$

$\theta = 2n\pi + \frac{\pi}{2}$ ✓

$$\theta = 2n\pi + \frac{\pi}{4} + \frac{\pi}{4}, \quad \theta = 2n\pi - \frac{\pi}{4} + \frac{\pi}{4}$$

Sol. Q 15 → (17, 18)

$$\sin x + \cos x - 2\sqrt{2}\sin x \cdot \cos x = 0$$

let

① $\boxed{\sin x + \cos x = t}$

$$(\sin x + \cos x)^2 = t^2$$

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

$$\Rightarrow \boxed{\sin x \cdot \cos x = \frac{t^2 - 1}{2}}$$

$$t - \cancel{2}\sqrt{2} \times \frac{(t^2-1)}{\cancel{2}} = 0$$

$$\sqrt{2}t^2 - t - \sqrt{2} = 0$$

$$\sqrt{2}t^2 - 2t + t - \sqrt{2} = 0$$

$$\sqrt{2}t(t - \sqrt{2}) + 1(t - \sqrt{2}) = 0$$

$$(\sqrt{2}t + 1)(t - \sqrt{2}) = 0$$

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

$$\sin x + \cos x = -\frac{1}{\sqrt{2}} \qquad AA = \sqrt{2}$$

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

$$\cos\left(x - \frac{\pi}{4}\right) = -\frac{1}{2} = \cos\frac{2\pi}{3}$$

$$x - \frac{\pi}{4} = 2n\pi \pm \frac{2\pi}{3}$$

$$t = \sqrt{2}$$

$$\sin x + \cos x = \sqrt{2} \qquad AA = \sqrt{2}$$

$$\cancel{\sqrt{2}}\left(\cos\left(x - \frac{\pi}{4}\right)\right) = \cancel{\sqrt{2}}$$

$$\cos\left(x - \frac{\pi}{4}\right) = 1 = \cos 0$$

$$x - \frac{\pi}{4} = 2n\pi \pm 0$$

$$\boxed{x = 2n\pi + \frac{\pi}{4}}$$

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Q 17 $\sin x + \cos x = 1 - \sin x \cdot \cos x$.

$$\boxed{\begin{aligned} &\text{let } \sin x + \cos x = t \\ &\sin x \cdot \cos x = \frac{t^2-1}{2} \end{aligned}}$$

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

$2t = 3 - t^2$

$t^2 + 2t - 3 = 0$

$(t+3)(t-1) = 0$

$t = -3$ or $t = 1$

Q18 $1 + (\sin^3 x + \cos^3 x) = \frac{3}{2} \sin 2x \rightarrow (\sin x)^3 + (\cos x)^3 + 1^3 = 3 \times 1 \times \sin x \times \cos x$

$a^3 + b^3$.

$1 + (\sin x + \cos x)(1 - \sin x \cdot \cos x) = 3 \sin x \cos x$

$a^3 + b^3 + c^3 - 3abc = 0$

$a + b + c = 0$ & $a = b = c$

$\sin x = \cos x = 1$

$\otimes$

$$\boxed{\begin{aligned} &\text{Let } \sin x + \cos x = t \\ &\sin x \cdot \cos x = \frac{t^2-1}{2} \end{aligned}}$$

19) $\sin 2x - 12(\sin x - \cos x) + 12 = 0$

$$\boxed{\begin{aligned} &\sin x - \cos x = t \\ &1 - \sin 2x = t^2 \Rightarrow \sin 2x = 1 - t^2 \end{aligned}}$$

$1 - t^2 - 12(t) + 12 = 0$

$t^2 + 12t - 13 = 0$ ✓

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Q 26.

$4(\sin x \cdot \sin 2x) \cdot \sin 4x - \sin 3x = 0$

$2(2\sin x \cdot \sin 2x)\sin 4x - \sin 3x = 0$

$2[\cos(-x) - \cos(3x)] \cdot \sin 4x - \sin 3x = 0$

$2\cos x \sin 4x - 2\cos 3x \cdot \sin 4x - \sin 3x = 0$

$\{\sin(5x) - \sin(-3x)\} - \{\sin(7x) + \sin(x)\} - \sin 3x = 0$

$\sin 5x + \cancel{\sin 3x} - \sin 7x - \sin x - \cancel{\sin 3x} = 0$

$(\sin 5x - \sin 7x) - \sin x = 0$

$2\cos(6x)\sin(x) - \sin x = 0$

$\sin x(2\cos 6x - 1) = 0 \Rightarrow \sin x = 0$ or $\cos 6x = \frac{1}{2}$

(29) $\sin 2x \cdot \sin 4x = \cos 6x - \cos 2x$

$\sin 2x \cdot \sin 4x = -2\sin(4x) \cdot \sin 2x$

$3\sin 2x \cdot \sin 4x = 0$

$\sin 2x = 0$, $\sin 4x = 0$

$2x = n\pi$ OR $4x = n\pi$

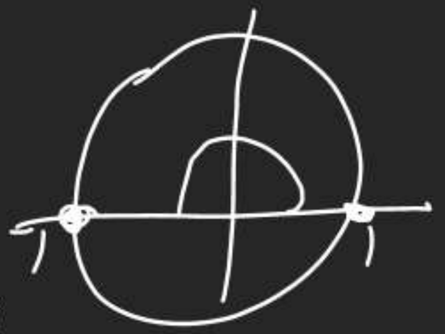
$x = \frac{n\pi}{2}$ OR $x = \frac{n\pi}{4}$

Q31 $\cos x \cdot \cos 6x = -1$

$2\cos x \cdot \cos 6x = -2$

$\underbrace{\cos(7x)}_{-1} + \underbrace{\cos(-5x)}_{-1} = -2$

Boundedness.



$\cos 7x = -1$ & $\cos 5x = -1$

$7x = (2n+1)\pi$, $5x = (2n+1)\pi$

$x = (2n+1)\frac{\pi}{7}$ $\qquad$ $x = (2n+1)\frac{\pi}{5}$

Q30 $\sec x \cdot \cos 5x + 1 = 0$

$\frac{1}{\cos x} \cdot \cos 5x + 1 = 0$

$\cos 5x + \cos x = 0$

$2\underbrace{\cos(3x)}_{0} \cdot \underbrace{\cos(2x)}_{0} = 0$

$3x = (2n+1)\frac{\pi}{2}$ $\qquad$ $2x = (2n+1)\frac{\pi}{2}$

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32 $2\sin^2 x - 5\sin x\cdot\cos x - 8\cos^2 x = -2\sin^2 x - 2\cos^2 x$ ***

$4\sin^2 x - 5\sin x\cos x - 6\cos^2 x = 0$ $\div \cos^2 x$

$4\tan^2 x - 5\tan x - 6 = 0$

$4\tan^2 x - 8\tan x + 3\tan x - 6 = 0$

$4\tan x(\tan x - 2) + 3(\tan x - 2) = 0$

$\tan x = -\frac{3}{4}$ $\tan x = 2$

$x = n\pi + \tan^{-1}\left(-\frac{3}{4}\right)$ $x = n\pi + \tan^{-1} 2$

(36) $\sin 6x + \cos 4x = -2$ ***

$\quad \| \qquad \qquad \|$

$\ -1 \qquad \quad -1$

(Boundedness.

$6x = 2n\pi - \frac{\pi}{2}$

$x = \frac{n\pi}{3} - \frac{\pi}{12}$

$4x = (2n+1)\pi$

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

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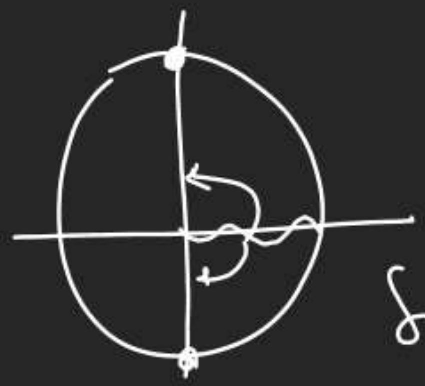
37) $\sin^6 x = \boxed{1} + \cos^4(3x)$

ये Sin का Max value है

ये ≥ 0 है

Zero hone के Siva Koi Rasta nahi Bcha.



$\sin^6 x = 1$

$\sin x = -1$ | $\sin x = 1$

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

$\cos^4(3x) = 0$

$\cos 3x = 0$

$3x = (2n+1)\frac{\pi}{2}$

$x = (2n+1)\frac{\pi}{6}$

39) $\sin^2 x + \cos^2 y = 2\sec^2 z$

$\leq 1 + \leq 1 \qquad \geq 1 \times 2$

$\leq 2 \qquad \geq 2$

Agree on 2

$\sin^2 x + \cos^2 y = 2$ & $2\sec^2 z = 2$

$\sin^2 x = 1$ & $\cos^2 y = 1$ & $\sec^2 z = 1$

$\sin x = \pm 1$

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

$\cos y = \pm 1$

$y = 2n\pi + 0$

or

$= (2n+1)\pi$

$\sec z = \pm 1$

$\cos z = \pm 1$

$z = 2n\pi$

or

$z = (2n+1)\pi$

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Q35 $\sin x\cos x[\sin^2 x+\sin x\cdot\cos x+\cos^2 x]=1$.

$\sin x\cdot\cos x(1+\sin x\cdot\cos x)=1$

$2\sin x\cdot\cos x(2+2\sin x\cos x)=4$

$\sin 2x(2+\sin 2x)=4$

$t(2+t)=4$

$t^2+2t-4=0$

$t=\frac{-2\pm\sqrt{4+16}}{2}=-1\pm\sqrt{5}$

$\sin 2x=-1-\sqrt{5}$ $\otimes$ | $\sin 2x=-1+\sqrt{5}$ $\neq\otimes$

Q49 $2\cos^2\left(\frac{x^2+x}{6}\right)=2^x+\frac{1}{2^x}$

$\le 1\times 2$ ≥ 2 (+ve / +ve fxn + उसके Reciprocal का Sum ≥ 2 होता है

≤ 2

$\cancel{2}\cos^2\left(\frac{x^2+x}{6}\right)=\cancel{2}1$

$\cos\left(\frac{x^2+x}{6}\right)=1$ or $\cos\left(\frac{x^2+x}{6}\right)=-1$

Ans → $2^2 \Rightarrow x = 2n\pi + \frac{\pi}{3}$
→ $(-2)^2 \Rightarrow x = 2n\pi - \frac{2\pi}{3}$

Q. No. of value of x Satisfying

$$(\sqrt{3}\sin x + \cos x)^{\sqrt{\sqrt{3}\sin 2x - \cos 2x + 2}} = 4 \; ; \; x \in (-\pi, \pi)$$

AA = 2

$$2\left(\frac{\sqrt{3}}{2}\sin x + \frac{1}{2}\cos x\right)^{\sqrt{2\sqrt{3}\sin x \cdot \cos x - \cos^2 x + \sin^2 x + 2\sin^2 x + 2\cos^2 x}} = 4$$

$$2\sin\left(x + \frac{\pi}{6}\right)^{\sqrt{3\sin^2 x + \cos^2 x + 2\sqrt{3}\sin x \cos x}} = 4$$

$$\left(2\sin\left(x + \frac{\pi}{6}\right)\right)^{\sqrt{(\sqrt{3}\sin x + \cos x)^2}} = 4$$

$$2\sin\left(x + \frac{\pi}{6}\right)^{|\sqrt{3}\sin x + \cos x|} = 4$$

$(-2)^2 = 4$

$2^2 = 4$ → Base = 2, Power = 2

Base = −2, Power = 2

$4^1 = 4$ (×)

$2\sin\left(x + \frac{\pi}{6}\right) = 2 \Rightarrow \sin\left(x + \frac{\pi}{6}\right) = 1$

$x + \frac{\pi}{6} = 2n\pi + \frac{\pi}{2} \Rightarrow \boxed{x = 2n\pi + \frac{\pi}{3}}$

$n = 0$

$x = 60^\circ$

$|\sqrt{3}\sin x + \cos x| = 2$

$\sqrt{3} \times \frac{\sqrt{3}}{2} + \cos 60^\circ$

$\left|\frac{3}{2} + \frac{1}{2}\right| = 2$

$2\sin\left(x + \frac{\pi}{6}\right) = -2$

$\sin\left(x + \frac{\pi}{6}\right) = -1$

$x + \frac{\pi}{6} = 2n\pi - \frac{\pi}{2}$

$x = 2n\pi - \frac{2\pi}{3}$ → $x = -120^\circ$

$|\sqrt{3}(-\sin 120^\circ) + \cos(-120^\circ)|$

$\left|-\sqrt{3} \times \frac{\sqrt{3}}{2} - \frac{1}{2}\right| = |-2| = 2$

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Advance Level Qs.

Q 2 Find value of x, y satisfying

$4^{\sin x} + 3^{\frac{1}{\cos y}} = 11$; $5 \cdot 16^{\sin x} - 2 \cdot 3^{\frac{1}{\cos y}} = 2$ ans?

let $4^{\sin x} = P$, $3^{\frac{1}{\cos y}} = Q$.

$P + Q = 11$

$Q = 11 - P$

$5 \cdot (4^{\sin x})^2 - 2 \cdot 3^{\frac{1}{\cos y}} = 2$

$5 \cdot P^2 - 2 \cdot Q = 2$

$5P^2 - 2(11 - P) = 2$

$5P^2 + 2P - 24 = 0$

$5P^2 - 10P + 12P - 24 = 0$

$5P(P-2) + 12(P-2) = 0$

$P = 2$ or $P = \frac{-12}{5}$

$Q = 11 - 2 = 9$ | $Q = 11 + \frac{12}{5} = \frac{67}{5}$

$P = 4^{\sin x} = 2$

$4^{\sin x} = 4^{1/2}$

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

$x = n\pi + (-1)^n \cdot \frac{\pi}{6}$

$Q = 3^{\frac{1}{\cos y}} = 9 = 3^2$

$\frac{1}{\cos y} = 2$

$\cos y = \frac{1}{2}$

$y = 2n\pi \pm \frac{\pi}{3}$

$(\text{Const})^{\text{var}}$ = Exponantial fxn $\oplus$

$P = 4^{\sin x} = \frac{-12}{5}$

$\oplus$ ve = $-$ve

Not Possible

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Q Sol. of Eqⁿ $\log_{\cos x}\sin x + \log_{\sin x}\cos x = 2$ is?

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

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

$t^2 + 1 = 2t$

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

$(t-1)^2 = 0$

$(\log_{\cos x}\sin x - 1)^2 = 0$

$\log_{\cos x}\sin x = 1$

$\sin x = \cos x$

$\tan x = 1 = \tan\frac{\pi}{4}$

$\boxed{x = n\pi + \frac{\pi}{4}}$

Q least +ve value of x for which

$\log_2 \sin x - \log_2 \cos x - \log_2(1+\tan x) - \log_2(1-\tan x) = -1$ is

$\log_2 \tan x - \{\log_2(1-\tan x) + \log_2(1+\tan x)\} = -1$

$\log_2 \tan x - \log_2(1-\tan^2 x) = -1$

$\log_2\left(\frac{\tan x}{1-\tan^2 x}\right) = -1$

$\log_2 \frac{1}{2}\left(\frac{2\tan x}{1-\tan^2 x}\right) = -1$

$\log_2 \frac{1}{2} \times \tan 2x = -1$

$\log_2 \frac{1}{2} + \log_2 \tan 2x = -1$

$\cancel{-1} + \log_2 \tan 2x = \cancel{-1}$

$\log_2 \tan 2x = 0$

$\tan 2x = 2^0$

$\tan 2x = 1$

$2x = n\pi + \frac{\pi}{4}$

$\boxed{x = \frac{n\pi}{2} + \frac{\pi}{8}}$