Nishant Jindal

$$\frac{1}{a}, \frac{1}{H_1}, \cdots, \frac{1}{H_n}, \frac{1}{c} \Rightarrow \frac{1}{H_1} = \frac{1}{a} + \frac{\frac{1}{c} - \frac{1}{a}}{n+1} = \frac{(n+1)c + (a-c)}{ac(n+1)}$$

$$= \frac{nc+a}{ac(n+1)}$$

$$\frac{ac(n+1)}{nc+a} - \frac{ac(n+1)}{na+c} = \frac{ac(\cancel{n+1})(\cancel{n}-1)(a-c)}{\underbrace{(1+n^2)ac + \cancel{n}(a^2+c^2)}} = ac(a-c)$$

$$\left(\frac{\cancel{n-1}}{n+1}\right)\left(\frac{\cancel{n-2}}{n}\right)\left(\frac{n-3}{\cancel{n-1}}\right)\left(\frac{n-4}{\cancel{n-2}}\right) \cdots \times \frac{2}{\cancel{4}} \cdot \frac{1}{\cancel{3}} = \frac{a_n}{a_1}$$

$$n^2 - 1 = (n^2+1)ac + n(a^2+c^2)$$

$$\sqrt{\frac{a_n}{a_{n-1}}} = \frac{n-1}{n+1} \qquad \frac{a_2}{\sqrt{a_1}} = \frac{1}{3}$$

$$\frac{a_{n-1}}{a_{n-2}} = \frac{n-2}{n}$$

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$9 \underline{\text{min}} \to 150 \times 9 = 1350$

$\boxed{150, 148, 146, - \quad - \quad \ldots} , 0, - \ldots$

$9(25a^2) + 9b^2 + 25c^2 + 15bc$

$= 25 \times 3ac + 15b(3a)$

$3150 = \frac{n}{2}\left(300 + (n-1)(-2)\right)$ n

$K = 3b = 15a = 5c \quad n = ?$

$(a, b, c) = \left(\frac{K}{15}, \frac{K}{3}, \frac{K}{5}\right)$

$\boxed{n+9}$

$\boxed{G_1, G_2, G_3 \cdot G \cdot M \cdot s \quad b/n \quad l, n}$

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$$\overbrace{\left(1^2 + \cdots + n^2\right) + \left(2^2 + 4^2 + \cdots n^2\right)}^{2 \cdot n^2}$$

$$\frac{n(n+1)(2n+1)}{6} + 4\,\frac{\frac{n}{2}\left(\frac{n}{2}+1\right)(n+1)}{6}$$

$$\left(\frac{n(n+1)}{2}\right)^2$$

$$\boxed{1^2 + 2\cdot 2^2 + 3^2 + 2\cdot 4^2 + \cdots 2\cdot(n-1)^2 + n^2}$$

$$\frac{(n-1)\,n^2}{2} + n^2$$

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1. $2\sin\left(3x+\frac{\pi}{4}\right) = \sqrt{1+8\sin 2x\cos^2 2x}$ $\to \pi$ $\to \pi$

$\boxed{T = 2\pi}$

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

$\frac{2\pi}{3}$

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

$x = 2n\pi+\frac{\pi}{12},\ 2n\pi+\frac{17\pi}{12}$, $n \in I$

$\sin$

$\sin\left(x+\cancel{\frac{\pi}{4}}\right)$

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

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

$2x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{13\pi}{6}, \frac{17\pi}{6}$

2 4

-4 4

16 16

$x = \frac{\pi}{12}, \frac{5\pi}{12}, \frac{13\pi}{12}, \frac{17\pi}{12}$

✓ ✗ ✗ ✓

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Q: $$\underbrace{\left(2^{\frac{1}{\sin^2 x}}\right)}_{\geq 2}^{\geq 1} \underbrace{\sqrt{y^2-2y+2}}_{\geq 1} \leq 2.$$, find x, y.

$=$

≥ 2

$\operatorname{cosec}^2 x = 1 \qquad \sin^2 x = 1$

$$\boxed{\begin{aligned} &y = 1 \\ &x = n\pi \pm \frac{\pi}{2}, n \in I \end{aligned}}$$

$\sin\theta \geq 1$

$\sin\theta = 1$

Nishant Jindal

3. Solve for x, y satisfying

$$\cos x \cos y = \frac{3}{4} \quad \text{and} \quad \sin x \sin y = \frac{1}{4}.$$

$$\cos(x-y) = 1 \Rightarrow x - y = 2n\pi \quad (1)$$

&

$$\cos(x+y) = \frac{1}{2} \Rightarrow x + y = 2m\pi \pm \frac{\pi}{3}. \quad (2)$$

$$\boxed{m, n \in I. \quad x = (n+m)\pi \pm \frac{\pi}{6}, \quad y = (m-n)\pi \pm \frac{\pi}{6}}$$

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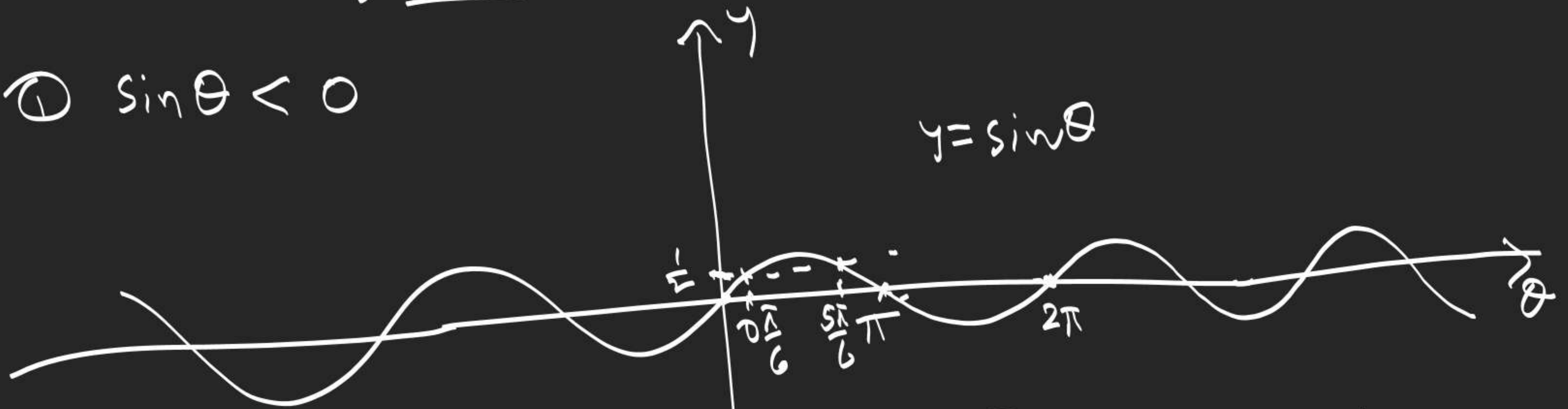
Inequality.

① $\sin\theta < 0$



$$\boxed{\theta \in (2n\pi + \pi, 2n\pi + 2\pi), \ n \in I}$$

② $\sin\theta > \frac{1}{2}$.

$$\boxed{\theta \in \left(2n\pi + \frac{\pi}{6}, 2n\pi + \frac{5\pi}{6}\right), \ n \in I}$$

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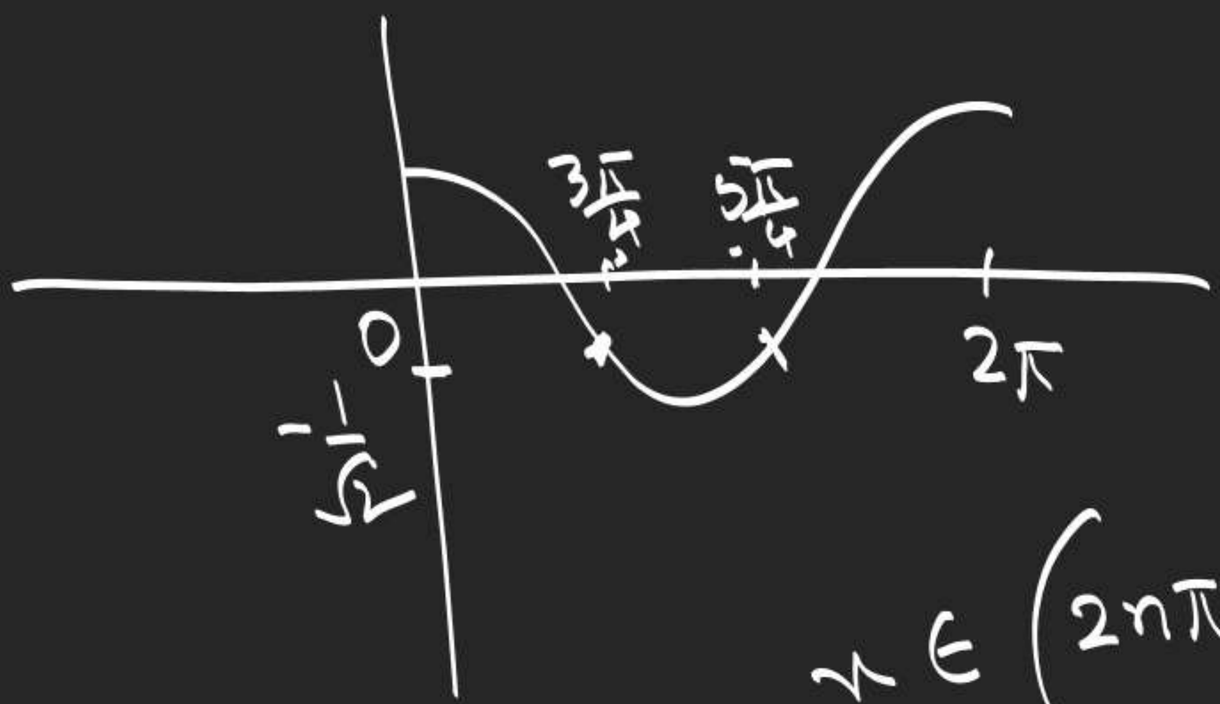
3.

$$\cos x < -\frac{1}{\sqrt{2}}$$



$$x \in \left(2n\pi + \frac{3\pi}{4}, 2n\pi + \frac{5\pi}{4}\right), n \in I.$$

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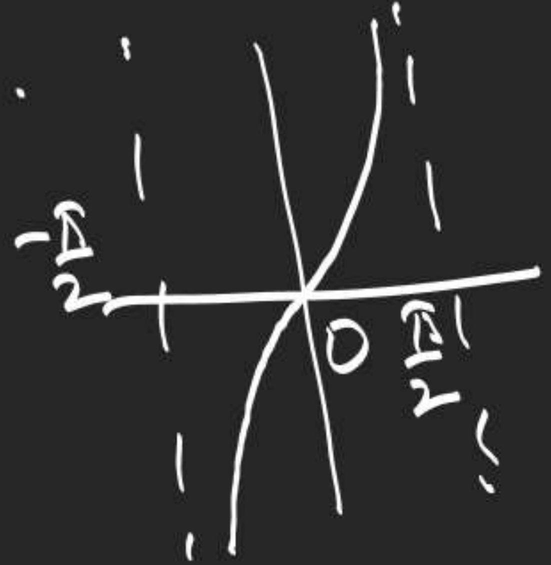
4. $\tan x > 0$



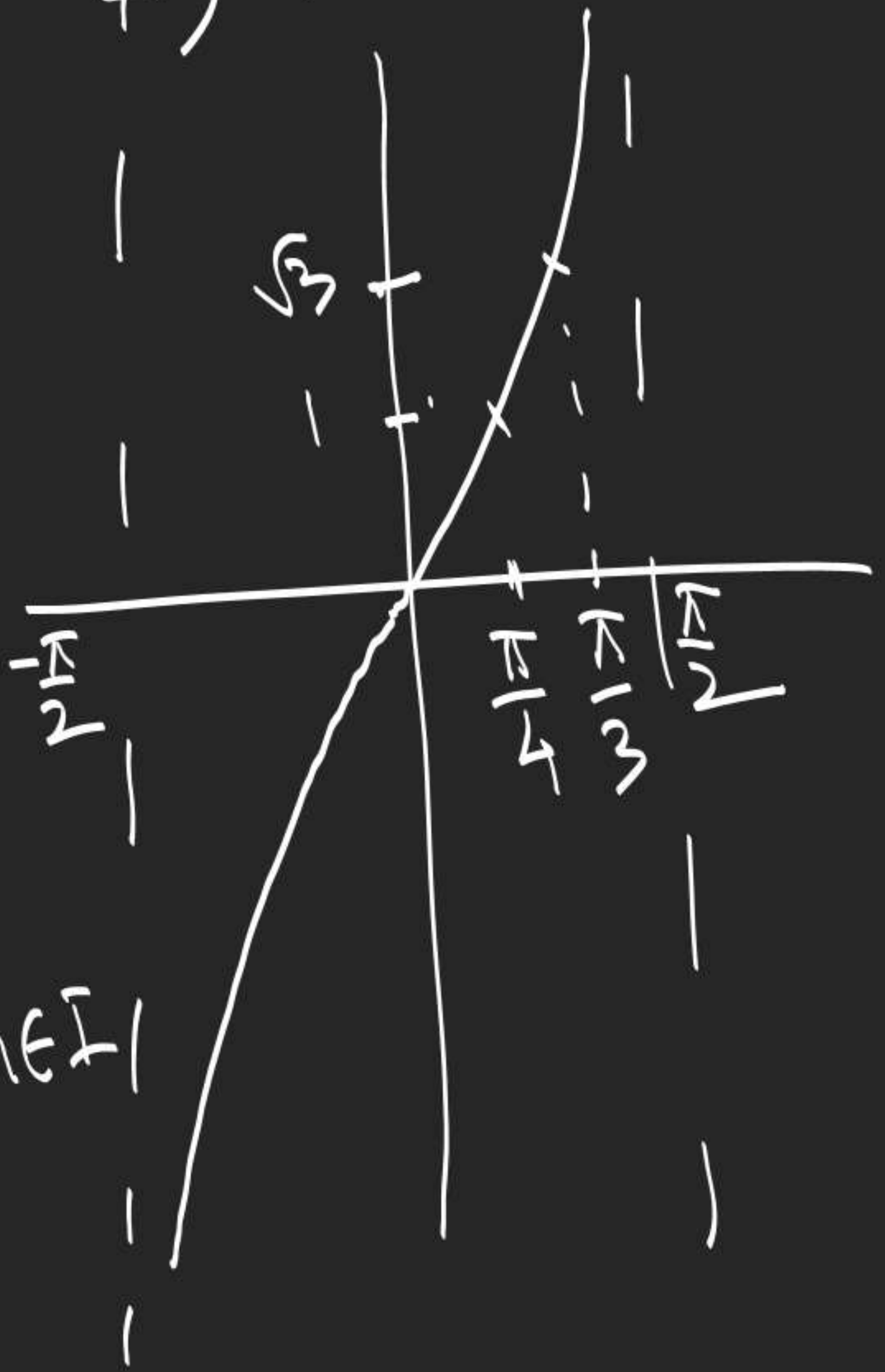
$x \in \left(n\pi + 0, n\pi + \frac{\pi}{2}\right), n \in I$.

5. $\tan^2 x - (\sqrt{3}+1)\tan x + \sqrt{3} < 0$

$(\tan x - \sqrt{3})(\tan x - 1) < 0$

$1 < \tan x < \sqrt{3}$

$x \in \left(n\pi + \frac{\pi}{4}, n\pi + \frac{\pi}{3}\right), n \in I$



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6. $\sin x \geq \cos 2x = 1 - 2\sin^2 x$

$$2\sin^2 x + \sin x - 1 \geq 0$$

$2 s x - s x$

$$(2\sin x - 1)(\sin x + 1) \geq 0$$

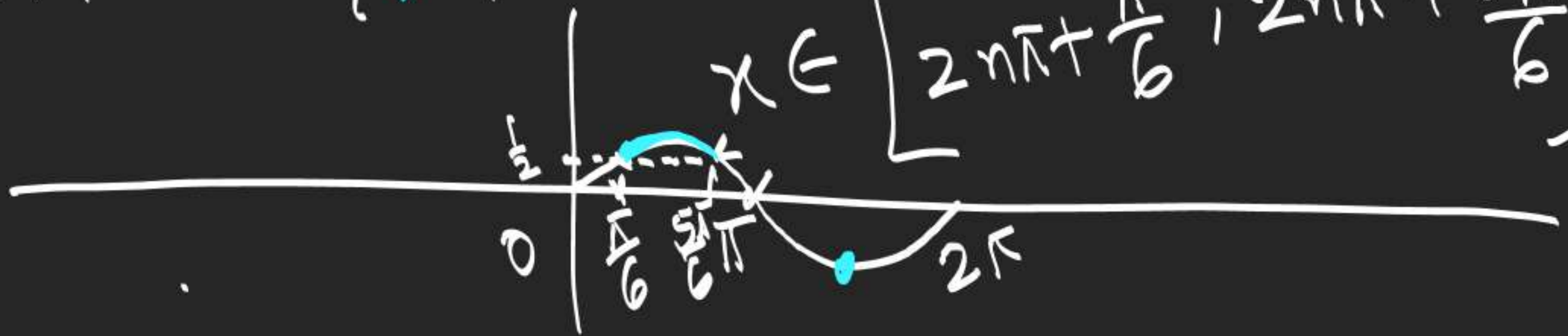
$+ \quad - \quad +$

$-1 \quad 1/2$

$$\sin x \in \{-1\} \cup \left[\frac{1}{2}, 1\right]$$

$$x \in \left[2n\pi + \frac{\pi}{6}, 2n\pi + \frac{5\pi}{6}\right] \cup \left\{2n\pi + \frac{3\pi}{2}\right\}$$

$n \in I$.



$\boxed{PT-1, 2, 3}$

$\downarrow$

Trig. Eqn.

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Find no. of solutions

$\sin x + 2\sin 2x = 3 + \sin 3x$ in $[0, \pi]$.

ϕ

$\sin x - \sin 3x + 2\sin 2x = 3$.

$-2\sin x\cos 2x + 4\sin x\cos x = 3$.

$\underbrace{2\sin x}_{\le 2}\left(\underbrace{2\cos x - 2\cos^2 x + 1}_{\le 2\left(\frac{1}{2}\right) - 2\left(\frac{1}{4}\right) + 1 = \frac{3}{2}}\right) = 3$.

≤ 3