Nishant Jindal

16 (A) $-1 \le \sin^2 x + 2\sin x + \frac{11}{4} \le 1$

2 $\quad >0$

$\left[\,|\sin x| + |\cos x|\,\right]$ $\quad T = \frac{\pi}{2}$ $\quad \left[\frac{1}{\sqrt{2}}, 1\right]$

$x \in \left[0, \frac{\pi}{2}\right]$

$x \in \left[0, \frac{\pi}{2}\right]$

$2 \le \sin^2 x + 2\sin x + \frac{11}{4}$

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

$\left[1, \sqrt{2}\right]$ $\quad \left[\frac{\pi}{4}, \frac{3\pi}{4}\right]$

$\sin^2 x + 2\sin x + \frac{3}{4} \ge 0$

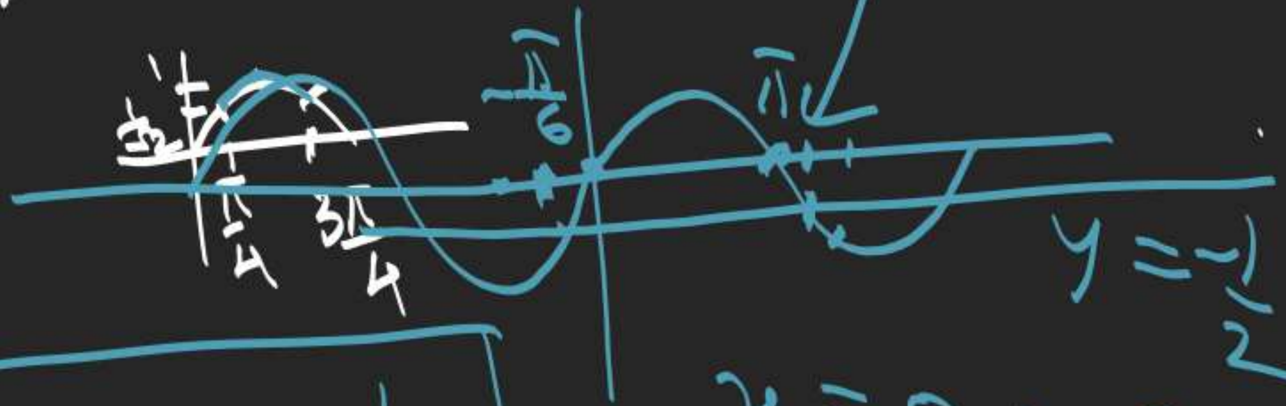
$(\sin x + 1)^2 \ge \frac{1}{4}$

$\sin x + 1 \ge \frac{1}{2}$ or $\sin x + 1 \le -\frac{1}{2}$

ϕ

$\boxed{\sin x \ge -\frac{1}{2}}$

$\pi + \frac{\pi}{6}$



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

$x = 0$

$, 2$

$\{x\}$

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(b) $[\cos a] + [\sin a] = -1$

$\quad -1, 0, 1 \qquad -1, 0, 1$

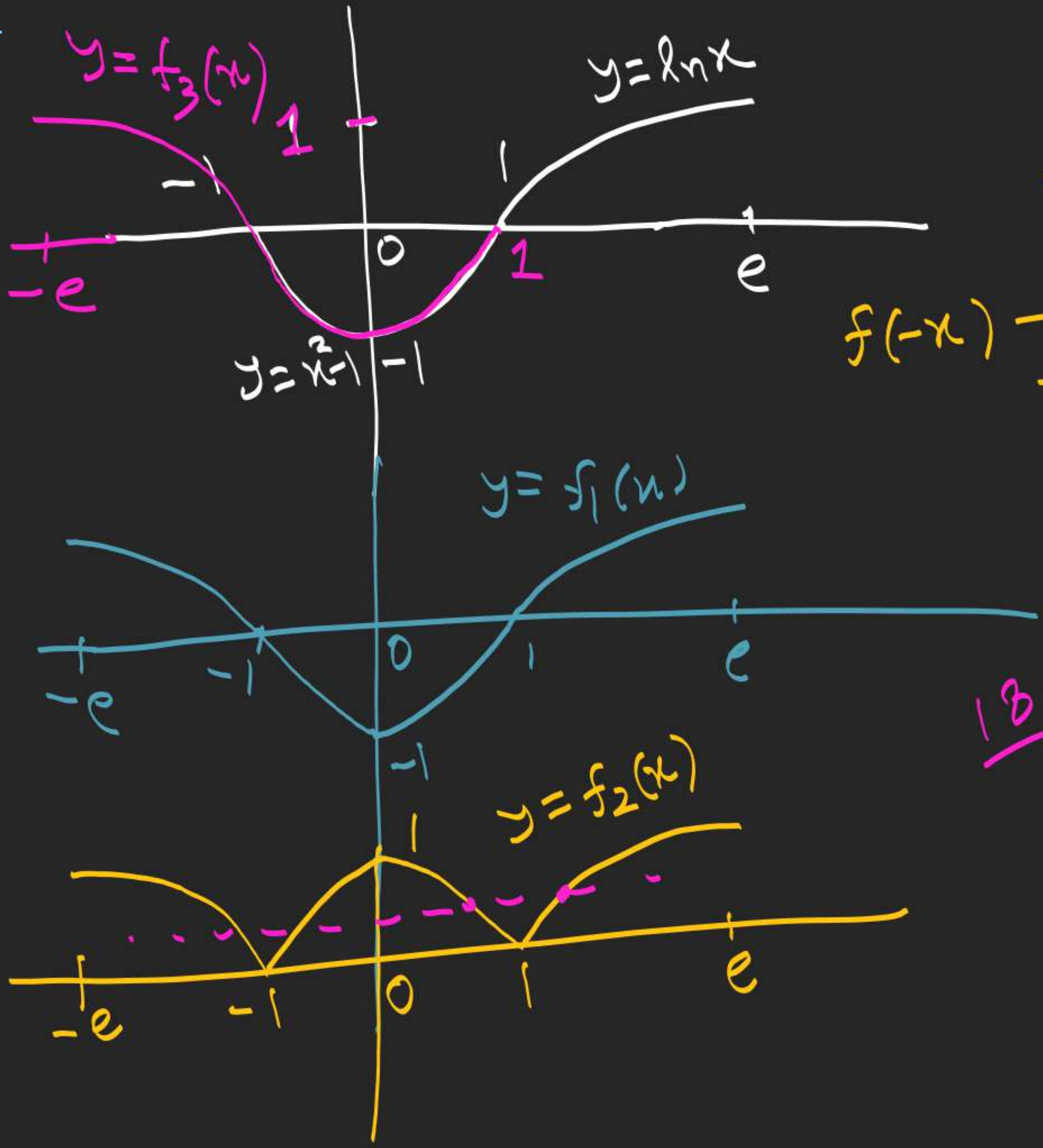
$-1 \quad \& \quad 0 \Rightarrow \cos a \in [-1, 0) \;\&\; \sin a \in [0, 1) \Rightarrow$

or $\qquad\qquad\qquad$ OR

$0 \quad \& \quad -1 \Rightarrow \cos a \in [0, 1) \;\&\; \sin a \in [-1, 0)$

$$a \in \left(\frac{\pi}{2}, \pi\right] \cup \left[\frac{3\pi}{2}, 2\pi\right)$$

$$\boxed{\tan a \in (-\infty, 0]}$$



$f(x) \to (\alpha, \beta)$

$f(-x) \to (-\alpha, \beta)$

$f_1 = f_2$

18. $[-e, -1] \cup [1, e]$

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

3. $(1+3)^n - 3n - 1 = {}^nC_2\, 3^2 + {}^nC_3\, 3^3 + \cdots$

5. $f(1) = 3$

$f(x+1) = f(x) + x + 3$

$f(2) = f(1) + 1 + 3$

$f(3) =$

9

$X \subset Y$

$X \cup Y = Y$

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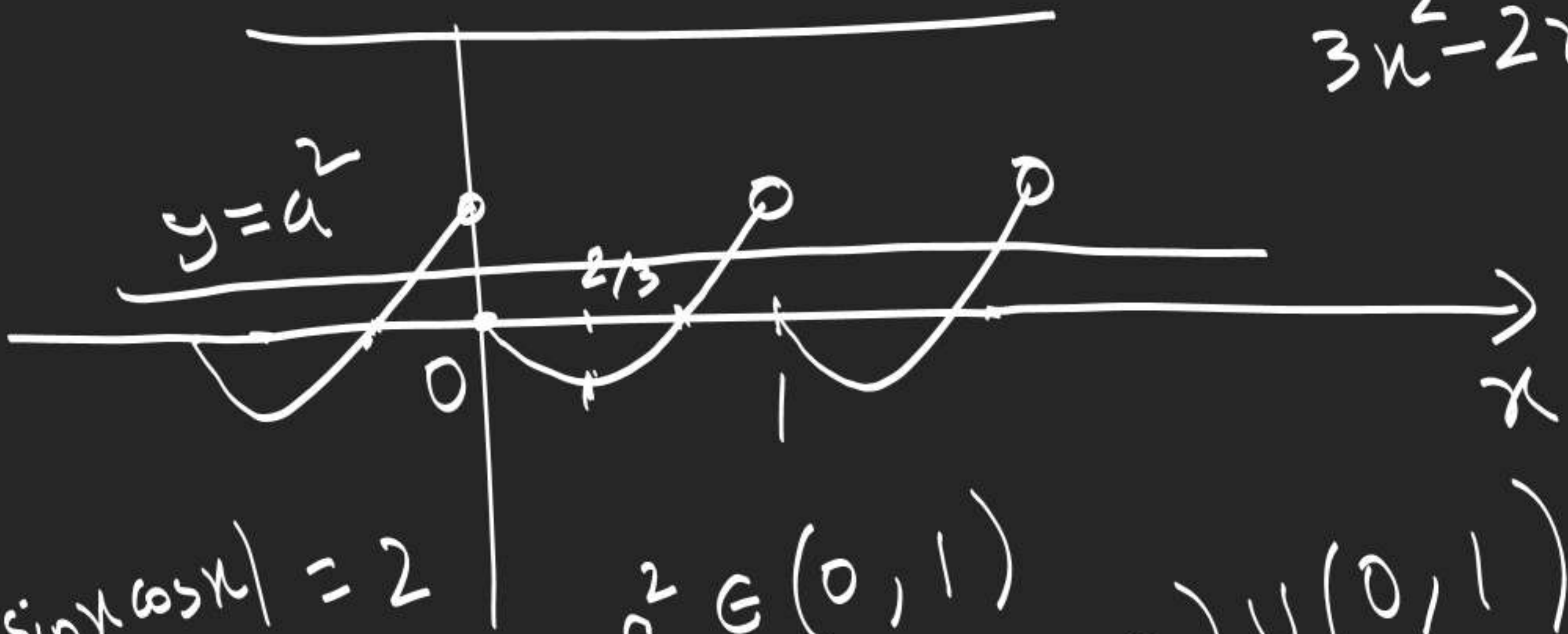
2.

$$\boxed{a^2} = \boxed{3\{x\}^2 - 2\{x\}}$$

$3x^2-2x$



$a^2 \in (0,1)$

$a \in (-1,0) \cup (0,1)$

8.

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

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9. $$\frac{8^{2f^{-1}(x)} - 8^{-2f^{-1}(x)}}{8^{2f^{-1}(x)} + 8^{-2f^{-1}(x)}} = \frac{x}{1}$$

13 → leave

$\frac{N}{D}$ $\qquad \frac{D+N}{D-N}$

18

$$8^{4f^{-1}(x)} = \frac{8^{2f^{-1}(x)}}{8^{-2f^{-1}(x)}} = \frac{1+x}{1-x}$$

$$f^{-1}(x) = \frac{1}{4}\log_8\left(\frac{1+x}{1-x}\right)$$

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14. $t + \frac{81}{t} = 30$

10. $x \in (1,2)$ $\quad y = \frac{x}{1+x^2} = \frac{1}{\frac{1}{x}+x} \uparrow \in \left(\frac{2}{5}, \frac{1}{2}\right)$

$x \in [2,3)$ $\quad y = \frac{2x}{1+x^2} = \frac{2}{x+\frac{1}{x}} \uparrow$

$1 - \frac{1}{x^2} > 0$

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$0 < x^2 - 5x + 5 < 1$

16

$x + y \le 6 = f(3)$

> 0

$\log_{\frac{1}{2}}$

$\frac{1}{2}$

$\boxed{x+y} \le 6$

$f(1) \quad f(2)$

$\left(6 - 2 + {}^{2}C_2\right) \times 6$

$-1 \le [2x^2] - 3 \le 1$

$2 \le [2x^2] \le 4$

$\boxed{2 \le 2x^2 < 5}$

$\boxed{1 \le x^2 < \frac{5}{2}}$

$x + y + z = 6$

$\geq 1 \geq 1$

$\boxed{\frac{f(x+1)}{f(x)} = 4\cancel{f(x)}}$

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$f(x) = \sin^{-1}\sin x$ $\quad T = 2\pi$

$D_f = R$

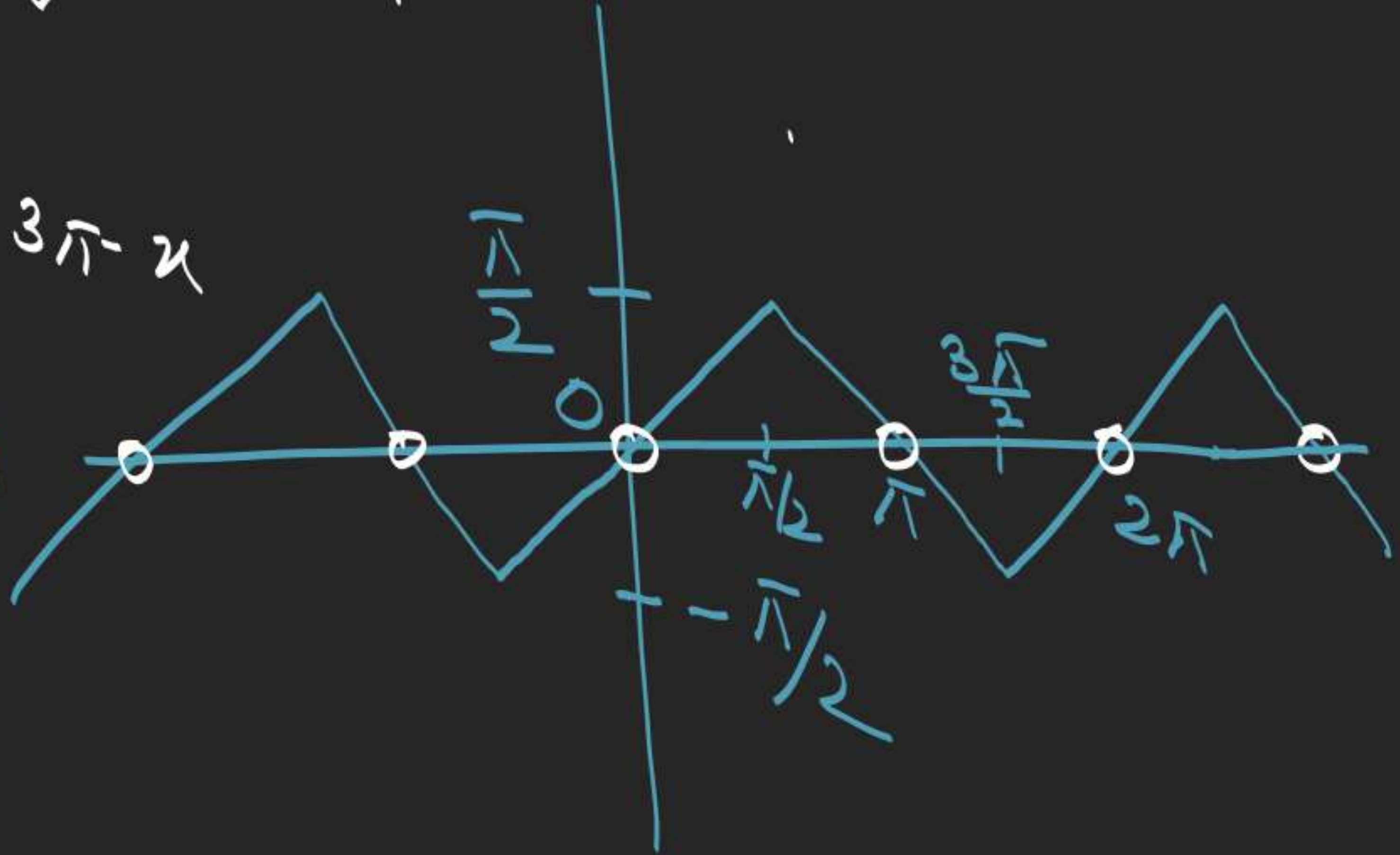
$R_f = \left[\frac{\pi}{2}, \frac{\pi}{2}\right]$

$$\boxed{\begin{array}{l} R_f = \left[-\frac{\pi}{2}, 0\right) \cup \left(0, \frac{\pi}{2}\right] \\ f(x) = \operatorname{cosec}^{-1}(\operatorname{cosec} x) \\ D_f = R - \{n\pi\},\ n \in I \qquad T = 2\pi \end{array}}$$

$\operatorname{cosec}^{-1}(\operatorname{cosec} x) = \theta \quad , \theta \in \left[-\frac{\pi}{2}, 0\right) \cup \left(0, \frac{\pi}{2}\right]$

$\operatorname{cosec}\theta = \operatorname{cosec} x$

$\sin\theta = \sin x$



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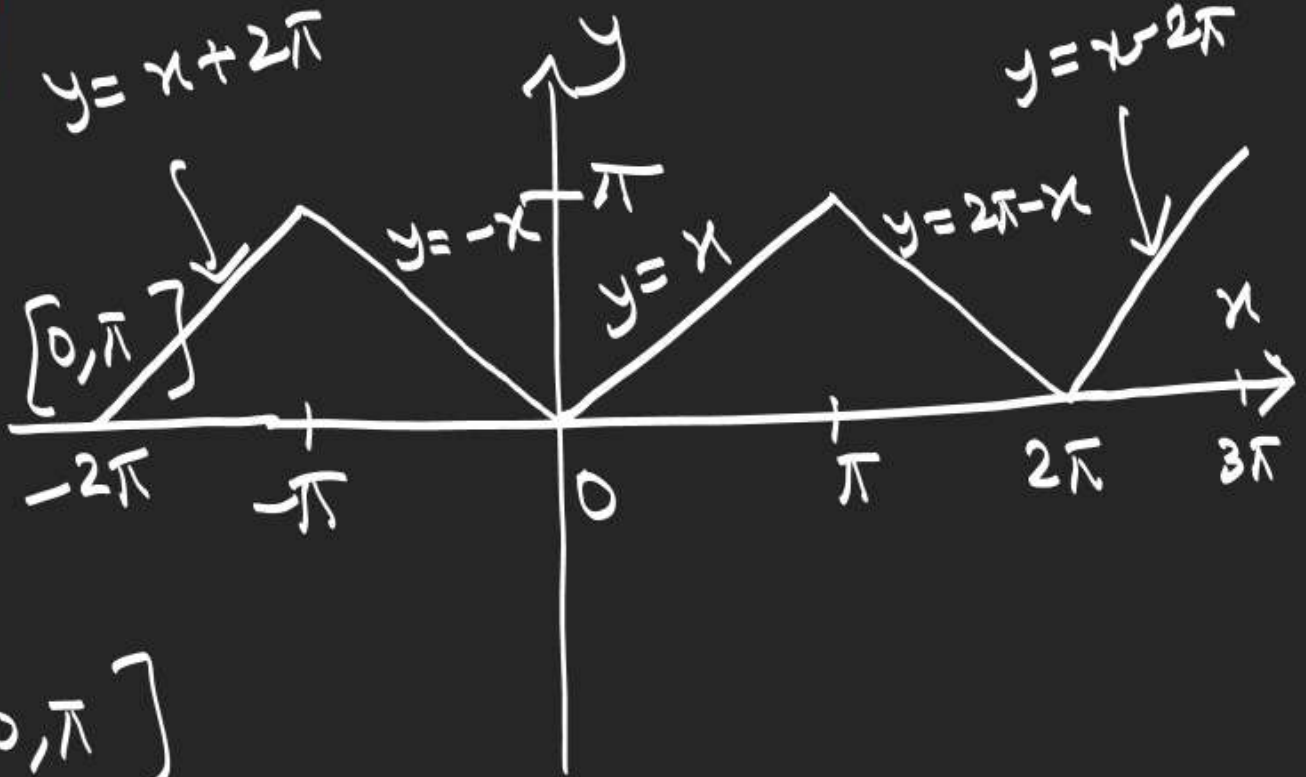
$$\boxed{\begin{array}{l} f(x)=\cos^{-1}(\cos x) \\ D_f = R \qquad R_f=[0,\pi] \\ T=2\pi \end{array}}$$



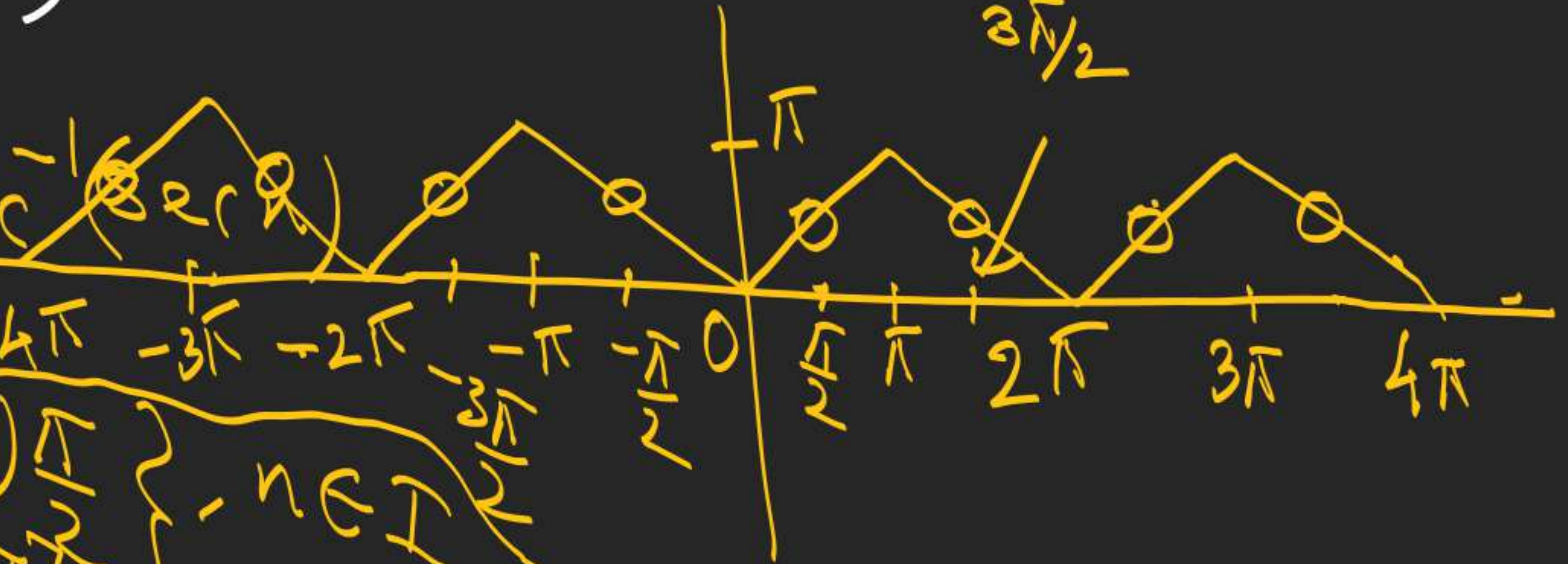
$\cos^{-1}(\cos x)=\theta \quad , \quad \theta\in[0,\pi]$

$\cos\theta = \cos x$

$\theta = 2n\pi \pm x \quad , \quad n\in I$

$$\theta = \begin{cases} x & x\in[0,\pi] \\ -x & x\in[-\pi,0] \end{cases}$$

$f(x)=\sec^{-1}(\sec x)$



$\boxed{T=2\pi}$

$D_f = R - \left\{(2n+1)\frac{\pi}{2}\right\} , n\in I$

$R_f = \left[0,\frac{\pi}{2}\right) \cup \left(\frac{\pi}{2},\pi\right]$

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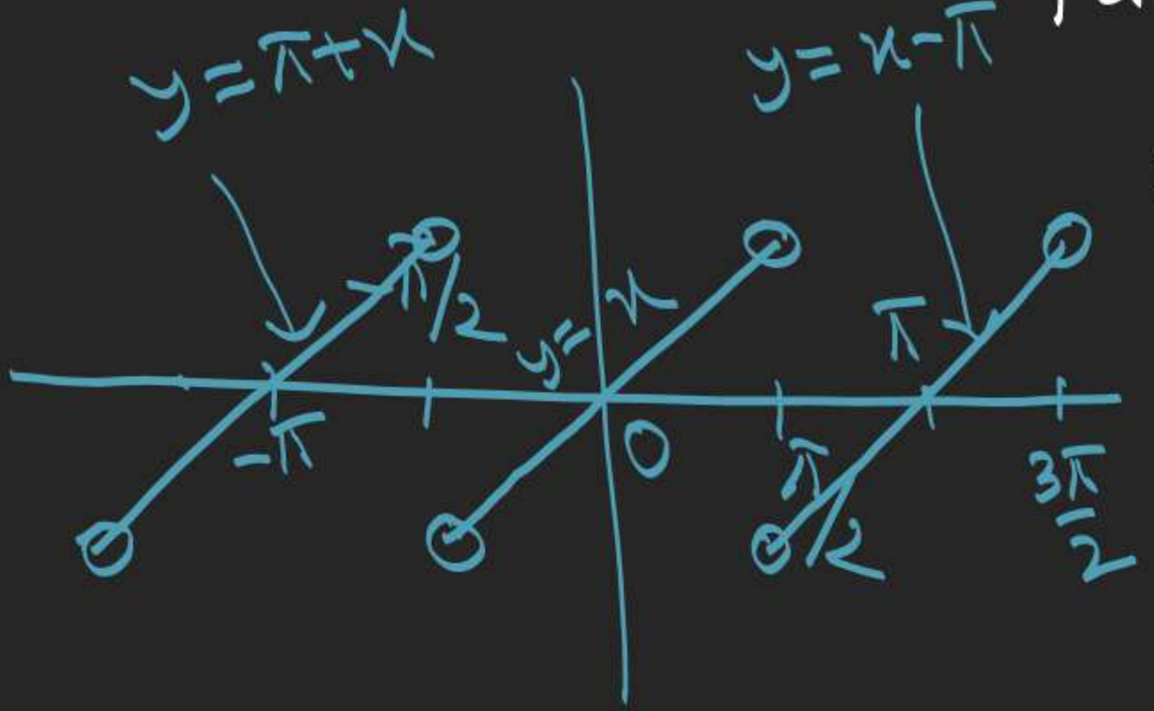
$$f(x) = \tan^{-1}(\tan x)$$

$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ $\quad \tan^{-1}\tan x = \theta \;,\quad \theta \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

$$\tan\theta = \tan x$$

$$\theta = n\pi + x \qquad n \in I$$

$$\theta = x \qquad x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$$



$$\boxed{\begin{aligned} D_f &= R - \left\{(2n+1)\frac{\pi}{2}\right\} \quad n \in I \\ R_f &= \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) \\ T &= \pi \end{aligned}}$$

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$\cot^{-1}\cot x = \theta \quad , \theta \in (0, \pi)$

$\cot\theta = \cot x$

$\theta = n\pi + x \quad , n \in I$

$\theta = x \quad , x \in (0, \pi)$

$$\boxed{\begin{aligned} D_f &= R - \{n\pi\} , n \in I \\ R_f &= (0, \pi) \\ T &= \pi \end{aligned}$$

Ex-4