

الف) $y = \frac{x+3}{2x^2+3x^2-1x+3} \rightarrow 2x^2+3x^2-1x+3 \neq 0 \rightarrow (x-1)(2x^2+5x-3) \neq 0$
 $D_y = R - \{1, -3, \frac{1}{2}\}$ $\Delta = b^2 - 4ac$
 $25 - (4 \times 2 \times -3) = 49$
 $\frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-5 \pm 7}{4}$
 $\frac{-5+7}{4} = \frac{2}{4} = \frac{1}{2}$
 $\frac{-5-7}{4} = \frac{-12}{4} = -3$

ب) $y = \frac{x+3}{2x^2+9x^2+10x+3} \rightarrow 2x^2+9x^2+10x+3 \neq 0 \rightarrow (x+1)(2x^2+7x+3) \neq 0$
 $D_y = R - \{-1, -\frac{3}{2}, -\frac{1}{2}\}$ $\Delta = b^2 - 4ac$
 $49 - (4 \times 2 \times 3) = 25$
 $\frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-7 \pm 5}{4}$
 $\frac{-7+5}{4} = \frac{-2}{4} = -\frac{1}{2}$
 $\frac{-7-5}{4} = \frac{-12}{4} = -3$

الف) $y = \frac{x+3}{x^2-2x^2+2x-1} \rightarrow x^2-2x^2+2x-1 \neq 0 \rightarrow (x^2-x+1)(x-1) \neq 0$
 $D_y = R - \{1\}$ $\Delta = b^2 - 4ac$
 $1 - (1 \times 1 \times 1) < 0$

ب) $y = \sqrt{\frac{x+3}{x^2-2x^2+2x-1}}$
 $\frac{x+3}{x^2-2x^2+2x-1} \geq 0 \rightarrow \frac{x+3}{(x^2-x+1)(x-1)} \geq 0$
 $D_y = (-\infty, -3] \cup (-1, +\infty)$ $\Delta = b^2 - 4ac$
 $1 - (1 \times 1 \times 1) < 0 \rightarrow$ همیشه مثبت

$y = \frac{2}{x^2-a|x-1|-2x+a} \rightarrow x^2-2x+a \leq |x-1| = 0$
 $I \rightarrow x \geq 1 \rightarrow x^2-2x+a - (x-1) + a = x^2-3x+2a+1$
 $\Delta = b^2 - 4ac$
 $9 - (4 \times 1 \times 2a) = 9$
 $\frac{-b \pm \sqrt{\Delta}}{2a} = \frac{3 \pm 3}{2}$
 $\frac{3+3}{2} = 3$
 $\frac{3-3}{2} = 0$
 $II \rightarrow x < 1 \rightarrow x^2-2x+a + (x-1) + a = x^2-x+2a-1$
 $\Delta = b^2 - 4ac$
 $1 - (1 \times 1 \times 2a) < 0$
 $D_y = R - \{2, a\}$

الف) $y = \sqrt{[-x]-2} \rightarrow [-x] \geq 2 \rightarrow D_y = (-\infty, -2]$

ب) $y = \frac{a|x^2+4}{[x]^2-2[x]-3} \rightarrow I: a|x^2+4|=0 \rightarrow a|x^2|=-4 \rightarrow x^2=-\frac{4}{a}$
 $II: [x]^2-2[x]-3=0 \rightarrow \Delta = b^2 - 4ac$
 $4 - (1 \times 1 \times -3) = 19$
 $\frac{-b \pm \sqrt{\Delta}}{2a} = \frac{2 \pm \sqrt{19}}{2}$
 $\frac{2+\sqrt{19}}{2}$
 $\frac{2-\sqrt{19}}{2}$
 $D_y = R - [3, 5] \cup [-2, -3]$

الف) $y = \sqrt{[x-\frac{1}{p}] + [x+\frac{1}{p}]} \rightarrow [x-\frac{1}{p}] + [x+\frac{1}{p}] \geq 0 \rightarrow [x+\frac{1}{p}-1] + [x+\frac{1}{p}] \geq 0$
 $[x+\frac{1}{p}]-1 + [x+\frac{1}{p}] \geq 0 \rightarrow 2[x+\frac{1}{p}] \geq 1 \rightarrow [x+\frac{1}{p}] \geq \frac{1}{2} \rightarrow x+\frac{1}{p} \geq 1 \rightarrow x \geq \frac{1}{p}$
 $D_y = [\frac{1}{p}, +\infty)$
 $b) y = \sqrt{[x-\frac{1}{p}] + [\frac{1}{p}+x]} \rightarrow \sqrt{[x-\frac{1}{p}]}[-(\frac{1}{p}-x)] \rightarrow$
 $\begin{cases} x \in \mathbb{Z} \rightarrow 0 \\ x \notin \mathbb{Z} \rightarrow -1 \end{cases}$
 $D_y = \{x | x = k + \frac{1}{p}, k \in \mathbb{Z}\}$

الف) $y = \frac{\cot x + 1}{\tan x + 1}$

$\tan x + 1 \neq 0 \rightarrow \tan x \neq -1$

$D_y = \mathbb{R} - \left\{ k\pi + \frac{\pi}{2}, k\pi + \frac{3\pi}{2} \right\}$

ب) $y = \sqrt{1 - r \sin^2 x}$

$1 - r \sin^2 x \geq 0 \rightarrow 1 \geq r \sin^2 x \rightarrow \frac{1}{r} \geq \sin^2 x \rightarrow -\frac{1}{\sqrt{r}} \leq \sin x \leq \frac{1}{\sqrt{r}}$

$D_y = \left[k\pi + \frac{\omega \pi}{4}, k\pi + \frac{\pi}{4} \right]$

الف) $y = \sqrt{r \sin x - 1}$

$r \sin x - 1 \geq 0 \rightarrow r \sin x \geq 1 \rightarrow \sin x \geq \frac{1}{r}$

$D_y = \left[k\pi + \frac{\pi}{4}, k\pi + \pi \right]$

ب) $y = \sqrt{1 - r \cos x}$

$1 - r \cos x \geq 0 \rightarrow 1 \geq r \cos x \rightarrow \frac{1}{r} \geq \cos x$

$D_y = \left[k\pi + \frac{\pi}{r}, k\pi + \frac{\pi}{4} \right]$

الف) $y = \arcsin(x^2 + rx + 1)$

$|\arcsin(x^2 + rx + 1)| < 1 \rightarrow -1 < x^2 + rx + 1 < 1$

I: $-1 < x^2 + rx + 1 \rightarrow 0 < x^2 + rx + r$

II: $x^2 + rx + 1 < 1 \rightarrow x^2 + rx < 0$

I ∩ II: $[-r, 0] \cup [0, 0]$

ب) $\cos y = \sqrt{\omega - rx}$

$\omega - rx \geq 0 \rightarrow \omega \geq rx \rightarrow \frac{\omega}{r} \geq x$

$(-\infty, \frac{\omega}{r}] \cap [r, \omega] = [r, \frac{\omega}{r}]$

الف) $y = \log_r \left(\frac{1 - \log_r x}{r} \right)$ $1 - \log_r x > 0 \rightarrow 1 > \log_r x \rightarrow r > x \rightarrow (-\infty, r)$

ب) $y = \log_r \left(\frac{1 - \log_r \frac{x}{r}}{r} \right)$ $1 - \log_r \frac{x}{r} > 0 \rightarrow 1 > \log_r \frac{x}{r} \rightarrow \frac{1}{r} > \frac{x}{r} \rightarrow x < 1 \rightarrow D_y = (-\infty, \frac{1}{r})$

الف) $y = \sqrt{r^2 x - x^2 - 1}$

$r^2 x - x^2 - 1 \geq 0 \rightarrow r^2 x - x^2 \geq 1 \rightarrow x^2 - r^2 x + 1 \leq 0$

$-x^2 + r^2 x - 1 \geq 0 \xrightarrow{a+b+c=0} \begin{cases} \frac{c}{a} = \frac{r}{-1} = -r \\ 1 \end{cases}$

$D_f = \mathbb{R} - \{1, r\}$

ب) $y = \left(\frac{r_k + \omega}{r_k + r} \right)!$ $\frac{r_k + \omega}{r_k + r} \in \omega \rightarrow r_k + \omega = r_k \omega + \varepsilon \omega \rightarrow r_k - r_k \omega = \varepsilon \omega - \omega$

$D_y = \left\{ x \mid x = \frac{r_k - \omega}{r - r_k}, k \in \omega \right\}$

$x \in \left(\frac{r_k - \omega}{r - r_k} \right)$