

الف) $\frac{x^2 - 4x}{x^2 - 21} \geq 0$

$\frac{x(x-4)}{x(x^2-1)} \geq 0$

$DF = (-1, 0) \cup (0, 1) \cup (4, +\infty)$

$-1 \quad 0 \quad 1 \quad 4$

$- \quad + \quad - \quad +$

ب) $\frac{x^3 - x^2}{x^2 - 21} \geq 0$

$\frac{x^2(x-1)}{x(x^2-1)} \geq 0 \rightarrow x^2 \geq 0$

$1, 0, -1$

$DF = \mathbb{R} - \{-1, 0, 1\}$

الف) $\frac{x+1}{\sqrt{x+|x|}}$

$DF = (0, +\infty)$

$x < 0: x+|x| = 0$

ب) $\frac{1}{\sqrt{x+|x|}} > 0 \rightarrow x > 0$

$DF = (0, +\infty)$

الف) $\sqrt{2-[x]}$

$2-[x] \geq 0 \quad [x] \leq 2 \rightarrow x \leq 3$

$DF = (-\infty, 3)$

ب) $\frac{1}{\sqrt{2-[x]}}$

$2-[x] > 0 \rightarrow [x] < 2 \rightarrow x < 3$

$DF = (-\infty, 2)$

الف) $y = \sqrt{\left[x - \frac{1}{x}\right] + \left[x + \frac{1}{x}\right]} \geq 0$

$x \geq \frac{1}{x}$

$DF = \left[\frac{1}{x}, +\infty\right)$

ب) $y = \sqrt{\underbrace{\left[x - \frac{1}{x}\right]}_a + \underbrace{\left[x + \frac{1}{x}\right]}_{-a}}$

$[a] + [-a] = 0$

$x - \frac{1}{x} = n$

$DF = \left\{n + \frac{1}{x} \mid n \in \mathbb{Z}\right\}$

الف) $\frac{1}{\sin x - 1}$

$\sin x \neq -1$

$DF = \mathbb{R} - \left\{2k\pi + \frac{3\pi}{2} \mid k \in \mathbb{Z}\right\}$

ب) $\frac{1}{1 - \sin x}$

$\sin x \neq 1 \rightarrow \frac{1}{x} \neq \frac{1}{x}$

$DF = - \left\{\frac{2k\pi}{x} + \frac{\pi}{x} \mid k \in \mathbb{Z}\right\}$

الف) $\sqrt{2\sin u - 1}$

$2\sin u - 1 \geq 0$

$\sin u \geq \frac{1}{2}$

$DP = [2K\pi + \frac{\pi}{6}, 2K\pi + \frac{5\pi}{6}]$

ب) $\sqrt{\cos u - 1}$

$\cos u \geq 1$

$\cos u = 1$

$DP = [2K\pi]$

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الف) $\cos y = |x| - 3$

$-1 \leq \cos y \leq 1 \rightarrow 2 \leq |x| \leq 4$

$DP = [-4, -2] \cup [2, 4]$

ب) $\arcsin(u^2 + 2u + 1)$

$-1 \leq u^2 + 2u + 1 \leq 1 \rightarrow u^2 + 2u \leq 0$
 $u^2 + 2u + 2 \geq 0$

$(u+1)(u+2) \geq 0$
 $u \leq -2 \text{ or } u \geq -1$

$DP = [-2, -1] \cup [0, 1]$

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الف) $\sqrt{2 - \log_2(n-2)}$

$n-2 > 0$

$\log_2(n-2) \leq 2$

$DP = (2, 11]$

$2 \leq n-2 \leq 9$
 $4 \leq n \leq 11$

ب) $\log(n^2 - n)$

$n^2 - n > 0$

$n(n-1)(n+1) > 0$

$DP = (-1, 0) \cup (1, \infty)$

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الف) $y = \frac{3}{x^2 + 1}$

$DP = \mathbb{R}$

$x^2 + 1 > 0$

ب) $y = \frac{3}{x^2 - 1}$

$x^2 - 1 \neq 0$

$DP = \mathbb{R} - \{0\}$

$x^2 \neq 1 \rightarrow x \neq \pm 1$

ج) $y = \frac{3}{x^2 - 2}$

$x^2 - 2 \neq 0 \rightarrow x^2 \neq 2 \rightarrow x \neq \pm \sqrt{2}$

$DP = \mathbb{R} - \{\pm \sqrt{2}\}$

د) $y = \frac{3}{x^2 - 3}$

$x^2 - 3 \neq 0 \rightarrow x^2 \neq 3 \rightarrow x \neq \pm \sqrt{3}$

$x \neq \pm \sqrt{3}$

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الف) $y = (x+1)!$

$x+1 \in \mathbb{N} \rightarrow x = \frac{n-1}{1}$

$DP = \left\{ \frac{k-1}{1} / k \in \mathbb{N} \right\}$

ب) $y = \left(\frac{x-2}{x-1} \right)!$

$\frac{x-2}{x-1} \in \mathbb{N}$

$\frac{ax+b}{cx+d} = y$
 $ax+b = y(cx+d)$
 $ax+b = cyx + dy$
 $ax - cyx = dy - b$
 $x(a - cy) = dy - b$
 $x = \frac{dy - b}{a - cy}$

$DP = \left\{ \frac{y(k-2)}{y(k-1)} / k \in \mathbb{N} \right\}$

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