

فراوانی

4. مرتبه

$$y = \sqrt{\frac{x^4 - 9x}{x^2 - x}}$$

$$x(x-9) \Rightarrow 0, 9$$

$$\frac{x^4 - 9x}{x^2 - x} \geq 0$$

$$x(x^3 - 1) \Rightarrow 0, +1, -1$$

x	-1	0	+1	9
y	-	+	+	+

$$D_f = (-1, 0) \cup (0, +1) \cup [9, +\infty)$$

$$y = \sqrt{\frac{x^5 - x^3}{x^3 - x}}$$

$$x^3(x^2 - 1) \Rightarrow 0, +1, -1$$

$$\frac{x^5 - x^3}{x^3 - x} \geq 0$$

$$x(x^2 - 1) \Rightarrow 0, +1, -1$$

x	-1	0	+1
y	+	+	+

$$D_f = \mathbb{R} - \{-1, 0, +1\}$$

$$y = \frac{x+1}{\sqrt{x+|x|}}$$

$$x + |x| > 0$$

$$D_f = \mathbb{R}^+$$

$$|x| > -x \Rightarrow \begin{cases} + \checkmark \\ 0 \times \\ - \times \end{cases}$$

$$y = \frac{1}{\sqrt{x|x|}}$$

$$x|x| > 0 \Rightarrow \begin{cases} + \checkmark \\ 0 \times \\ - \times \end{cases}$$

$$D_f = \mathbb{R}^+$$

الف $y = \sqrt{2 - [x]}$ $2 - [x] \geq 0$ $[x] \leq 2$

$D_f : (-\infty, +3)$

ب) $y = \frac{1}{\sqrt{2 - [x]}}$ $2 - [x] > 0$ $[x] < 2$

$D_f : (-\infty, +2)$

الف $\sqrt{[x - \frac{1}{3}] + [x + \frac{2}{3}]} \Rightarrow [x - \frac{1}{3}] + [x + \frac{2}{3}] \geq 0 \Rightarrow$

$[x + \frac{2}{3} - 1] + [x + \frac{2}{3}] \geq 0 \Rightarrow [x + \frac{2}{3}] - 1 + [x + \frac{2}{3}] \geq 0 \Rightarrow$

$2[x + \frac{2}{3}] \geq 1 \Rightarrow [x + \frac{2}{3}] \geq \frac{1}{2}$ او بين عدد صحيح
بزرگتر از 1/2 است $\Rightarrow x + \frac{2}{3} \geq 1$

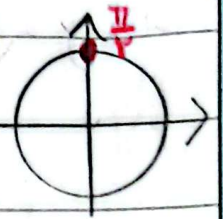
$x \geq \frac{1}{3} \Rightarrow D_f : [\frac{1}{3}, +\infty)$

ب) $\sqrt{[x - \frac{1}{3}] + [-x + \frac{1}{3}]} \Rightarrow [x - \frac{1}{3}] + [-x + \frac{1}{3}] \geq 0$

$\begin{cases} a \in \mathbb{Z} & [a] + [-a] = 0 \\ a \notin \mathbb{Z} & [a] + [-a] = -1 \end{cases} \Rightarrow x - \frac{1}{3} \in \mathbb{Z} \Rightarrow D_f : \{x | x = k + \frac{1}{3}, k \in \mathbb{Z}\}$

الف) $y = \frac{2}{\sin x - 1}$

$\sin x - 1 \neq 0 \quad \sin x \neq 1$

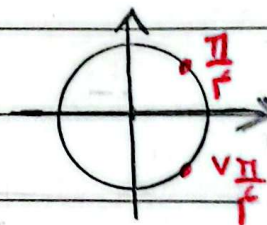


$D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{2}\}$

ب) $y = \frac{2}{2\sin^2 x - 1}$

$2\sin^2 x - 1 \neq 0 \rightarrow 2\sin^2 x \neq 1 \rightarrow \sin^2 x \neq \frac{1}{2}$
 $\rightarrow \sin x \neq \pm \sqrt{\frac{1}{2}} \rightarrow \sin x \neq \pm \frac{1}{\sqrt{2}} \rightarrow \sin x \neq \pm \frac{\sqrt{2}}{2}$

$D_f = \mathbb{R} - \{2k\pi + \frac{\pi}{4}, 2k\pi + \frac{3\pi}{4}\}$

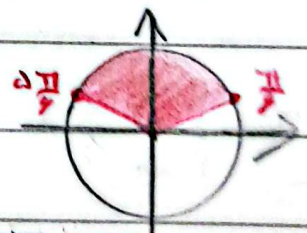


ج) الف) $y = \sqrt{2\sin x - 1}$

$2\sin x - 1 \geq 0 \quad 2\sin x \geq 1$

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

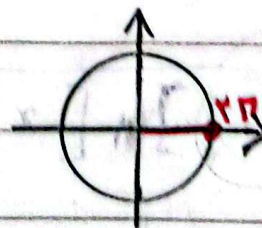
$D_f = [2k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6}]$



ب) $y = \sqrt{2\cos x - 1}$

$2\cos x - 1 \geq 0 \quad 2\cos x \geq 1$

$D_f = \{2k\pi\}$

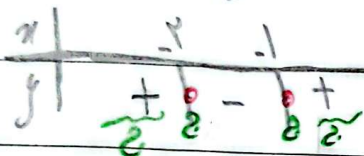


الف $\cos y = |x| - 3 \quad -1 \leq |x| - 3 \leq +1 \quad +2 \leq |x| \leq +4$

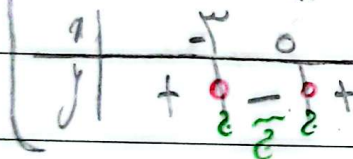
$D_f: [-4, -2] \cup [2, 4]$

ب $y = \arcsin(x^2 + 3x + 1) \quad -1 \leq x^2 + 3x + 1 \leq +1$

I: $x^2 + 3x + 1 \geq -1 \quad x^2 + 3x + 2 \geq 0 \quad (x+1)(x+2) \geq 0$



II: $x^2 + 3x + 1 \leq +1 \quad x^2 + 3x \leq 0 \quad x(x+3) \leq 0$



$D_f: (I) \cup (II) \Rightarrow D_f: [-3, -2] \cup [-1, 0]$

الف $y = \sqrt{2 - \log_3(x-2)} \quad x-2 > 0 \quad x > 2 \quad I$

$2 - \log_3(x-2) \geq 0 \quad 2 \geq \log_3(x-2) \quad x-2 \leq 3^2 \quad x-2 \leq 9 \quad x \leq 11 \quad II$

$D_f: I \cup II \Rightarrow D_f: [2, 11]$

تجزیه

$$\rightarrow \log(x^2 - x) \quad x^2 - x > 0 \quad x(x-1) > 0$$

$$\begin{array}{c|ccc} x & -1 & 0 & +1 \\ \hline f & - & + & - \end{array}$$

$$D_f: (-1, 0) \cup (1, +\infty)$$

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$$y = \frac{x^2}{f^x + 1}$$

$$\rightarrow f^x + 1 \neq 0 \rightarrow f^x \neq -1$$

مقادیر منفی

$$D_f: \mathbb{R}$$

$$y = \frac{x^2}{f^x - 1}$$

$$f^x - 1 \neq 0 \quad f^x \neq 1 \quad f^x \neq f^0 \quad x \neq 0$$

$$D_f: \mathbb{R} - \{0\}$$

$$y = \frac{x^2}{f^x - 2}$$

$$f^x - 2 \neq 0 \quad f^x \neq 2$$

$$x \neq \log_f 2$$

$$D_f: \mathbb{R} - \{\log_f 2\}$$

$$y = \frac{x^2}{f^x - 3}$$

$$f^x - 3 \neq 0 \quad f^x \neq 3$$

$$x \neq \log_f 3$$

$$D_f: \mathbb{R} - \{\log_f 3\}$$

مخرجات

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$$y = (f(x+1))!$$

$$f(x+1) \in W \quad f(x) \in W-1$$

$$x \in \frac{W-1}{f}$$

$$Df: \left\{ x \mid x = \frac{k-1}{f}, k \in W \right\}$$

$$y = \left(\frac{\gamma x - \gamma}{\gamma x - a} \right)!$$

$$\frac{\gamma x - \gamma}{\gamma x - a} \in W$$

$$\gamma x - \gamma \in \gamma x W - aW$$

$$\gamma x - \gamma x W \in -aW + \gamma$$

$$x = \frac{\gamma - aW}{\gamma - \gamma W}$$

$$Df: \left\{ x \mid x = \frac{\gamma k - \gamma}{\gamma k - a}, k \in W \right\}$$