

$$y = \frac{\sin x - 2}{2 \cos x + 1}$$

$$2 \cos x + 1 \neq 0$$

$$2 \cos x \neq -1$$

$$\cos x \neq -\frac{1}{2} \rightarrow$$

$$D_f = \left\{ x \in \mathbb{R} \mid x \neq \frac{2\pi}{3} + 2k\pi, x \neq \frac{4\pi}{3} + 2k\pi, k \in \mathbb{Z} \right\}$$

$$x = \frac{2\pi}{3} + 2k\pi$$

$$x = \frac{4\pi}{3} + 2k\pi$$

cos زاویه های که در این دو مجموعه قرار دارند $-\frac{1}{2}$

$$y = \frac{\sin x + 2}{\cos x - 1}$$

$$\cos x - 1 \neq 0$$

$$\cos x \neq 1 \rightarrow x = 2k\pi$$

$$D_f = \{ x \in \mathbb{R} \mid x \neq 2k\pi, k \in \mathbb{Z} \}$$

$$y = \frac{2 \sin x + 1}{\tan x + 1}$$

$$\tan x + 1 \rightarrow \tan x = \frac{\sin x}{\cos x} \rightarrow \cos x \neq 0, \tan x + 1 \neq 0$$

$$\tan x \neq -1 \rightarrow x = \frac{3\pi}{4} + k\pi$$

$$D_f = \left\{ x \in \mathbb{R} \mid x \neq \frac{\pi}{4} + k\pi, x \neq \frac{3\pi}{4} + k\pi, k \in \mathbb{Z} \right\}$$

$$y = \frac{\cos x + 1}{\cot x - 1}$$

$$\cot x - 1 \rightarrow \cot x = \frac{\cos x}{\sin x}$$

$$\sin x \rightarrow \sin x \neq 0, \cot x - 1 \neq 0$$

$$x = k\pi$$

$$\cot x \neq 1 \rightarrow x = \frac{\pi}{4} + k\pi$$

$$D_f = \left\{ x \in \mathbb{R} \mid x \neq k\pi, x \neq \frac{\pi}{4} + k\pi, k \in \mathbb{Z} \right\}$$

$$\sin y = x^2 - 2$$

$$-1 \leq \sin y \leq 1$$

$$-1 \leq x^2 - 2 \leq 1$$

$$-1 + 2 \leq x^2 - 2 + 2 \leq 1 + 2$$

$$1 \leq x^2 \leq 3$$

$$x \geq 1 \vee x \leq -1$$

$$-\sqrt{3} \leq x \leq \sqrt{3} \rightarrow \text{از هر دو اشتراک می گیریم}$$

$$D_f = [\sqrt{3}, -1] \cup [1, \sqrt{3}]$$

$$y = \arccos(\sqrt{x} - 2)$$

$$x \geq 0$$

$$-1 \leq \sqrt{x} - 2 \leq 1$$

$$-1 \leq \sqrt{x} - 2$$

$$\sqrt{x} - 2 \leq 1$$

$$-1 + 2 \leq \sqrt{x}$$

$$\sqrt{x} \leq 1 + 2$$

$$(2 \leq \sqrt{x})^2$$

$$(\sqrt{x})^2 \leq (3)^2$$

$$4 \leq x$$

$$x \leq 9$$

$$D_f = [4, 9]$$

$$\cos y = |x| - r$$

$$-1 \leq |x| - r \leq 1$$

$$D_f = [-r, -r] \cup [r, r]$$

(الف) (3)

$$x \geq r$$

$$-1+r \leq |x| \quad |x| \leq 1+r$$

$$r \leq |x| \quad |x| \leq r \rightarrow -r \leq x \leq r$$

$$y = \arcsin(x^r + r|x+1|)$$

$$-1 \leq x^r + r|x+1| \leq 1$$

$$D_f = [-r, -r] \cup [-1, 0]$$

(ب)

$$-1 \leq x^r + r|x+1| \quad x^r + r|x+1| \leq 1$$

$$0 \leq x^r + r|x+1| \quad x^r + r|x| \leq 0$$

$$(x+1)(x+r) = 0 \quad x(x+r) \leq 0 \rightarrow -r \leq x \leq 0$$

$$x = -1, x = -r, \text{ and } x = 0$$

$$y = \log_r x^{r-r}$$

$$x^{r-r} > 0$$

$$D_f = (-\infty, -r) \cup (r, +\infty)$$

(الف) (4)

$$x^{r-r} = 0 \rightarrow x^r = r \begin{cases} x = r \\ x = -r \end{cases}$$

$$x^{r-r} > 0 \rightarrow x < -r \text{ or } x > r$$

(3)

$$y = \log_r r - |x|$$

$$r - |x| > 0$$

$$D_f = (-r, r)$$

$$r > |x| \rightarrow -r < x < r$$

$$y = \log_{x-r} \frac{2-x}{x-r}$$

$$2-x > 0 \rightarrow x < 2$$

$$D_f = (r, r) \cup (r, 2)$$

(الف) (4)

$$x-r > 0 \rightarrow x > r$$

$$D_f = \{x \in \mathbb{R} \mid r < x < 2, x \neq r\}$$

(3)

$$y = \log_{x+r} x^{r-1}$$

$$x^{r-1} > 0 \rightarrow x > 1 \text{ or } x < -1$$

$$D_f = (-r, -r) \cup (-r, -1) \cup (1, +\infty)$$

$$x+r \neq 1 \rightarrow x \neq -r$$

$$y = \log \frac{x^r - r|x+r|}{x-r}$$

$$\frac{x^r - r|x+r|}{x-r} > 0 \rightarrow \frac{(x-1)(x-r)}{x-r} > 0$$

(الف) (4)

$$x \neq r$$

$$x > 1$$

$$D_f = (1, r) \cup (r, +\infty)$$

(3)

$$y = \log \frac{x+r}{x-2}$$

$$\frac{x+r}{x-2} > 0$$

$$D_f = (-2, -r) \cup (-r, -r) \cup (r, +\infty)$$

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$$x+2 > 0 \text{ or } x+2 \neq 1$$

$$y = \sqrt{r - \log_r(x-r)}$$

$$\begin{aligned} r - \log_r(x-r) &\geq 0 \rightarrow \log_r(x-r) \leq r \\ x-r &> 0 & x-r &\leq r^r \\ x &> r & x-r &\leq 1 \\ & & x &\leq 10 \end{aligned}$$

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$$D_f = (r, 10]$$

$$y = \log(2 \log_r^x - 1)$$

$$x > 0$$

$$D_f = (\sqrt{r}, +\infty)$$

(ب)

$$\log x - 1 > 0 \rightarrow 2 \log x > 1 \rightarrow \log x > \frac{1}{2} \rightarrow x > \sqrt{r}$$

$$y = \frac{r}{r^x + 1}$$

$$D_f = \mathbb{R}$$

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$$y = \frac{r}{r^x - 1}$$

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

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$$y = \frac{r}{r^x - r}$$

$$D_f = (-\infty, -\frac{r}{r}) \cup (0, +\infty)$$

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$$y = \frac{r}{r^x - r}$$

$$D_f = \mathbb{R} - \log_r^r$$

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$$D_f = \mathbb{R} - \left\{ \frac{1}{r} \right\}$$

$$y = (r^x - 1)!$$

$$\begin{aligned} r^x - 1 &\geq 0 \\ r^x &\geq 1 \\ x &\geq \frac{1}{r} \end{aligned}$$

$$D_f = \left\{ \frac{n+1}{r} \mid n \in \mathbb{Z}, n \geq 0 \right\}$$

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

$$\frac{r^x - r}{r^x - a} = n \rightarrow n \geq 0, n \in \mathbb{N}$$

(ب)

$$r^x - r = n(r^x - a)$$

$$r^x - r = r^n x - a n$$

$$r^x - r n x = r - a n$$

$$x(r - r n) = r - a n$$

$$x = \frac{r - a n}{r - r n}, n \in \mathbb{N}$$

$$D_f = \left\{ x \in \mathbb{R} \mid \frac{r^x - r}{r^x - a} \in \mathbb{Z} \cup \{0\}, x \neq r, a \right\}$$

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