

$$\frac{(x-1)(x^2+x+1)}{x(x-1)(x+1)}$$

$> 0 \Rightarrow$

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

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$$y = \sqrt{\frac{x^3-1}{x^3-x}}$$

$$\frac{x^3-1}{x^3-x} \geq 0$$

$$x^3-1 \neq 0$$

$$\cancel{x \neq 1}$$

(K)

$$\frac{1}{x(x+1)} > 0 \Rightarrow x \neq -1$$

$$x = -1 \quad x = 0$$

(1)

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

$$\Rightarrow \sqrt{\frac{x^2-14}{x^2-2x+2}}$$

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

$$x \neq 2, x \neq -1$$

$$\frac{x+2}{x-1} \geq 0 \quad (x \neq 2)$$

$$x = 1 \quad x = -2$$

$$\begin{array}{c|ccc} -2 & 1 & * & \\ \hline + & - & + & + \end{array}$$

$$D_f = [-\infty, -2] \cup (1, 2) \cup (2, +\infty)$$

$$y = \sqrt{4-x} - \sqrt{2-x}$$

(5) انك

$$2-x \geq 0 \Rightarrow x \leq 2$$

$$4-\sqrt{2-x} \geq 0 \Rightarrow \sqrt{2-x} \leq 2 \Rightarrow 2-x \leq 4 \Rightarrow x \geq -2$$

$$D_f = [-2, 2]$$

$$y = \sqrt{3-x} - \sqrt{x-1}$$

$$x-1 \geq 0 \Rightarrow x \geq 1$$

(-)

$$3-\sqrt{x-1} \geq 0 \Rightarrow \sqrt{x-1} \leq 2 \Rightarrow x-1 \leq 4 \Rightarrow x \leq 5$$

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(2)

$$D_f = [1, 5]$$

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

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(4)

$$4-x^2 \geq 0 \Rightarrow x^2 \leq 4 \Rightarrow x \leq 2$$

$$D_f = [-2, 2]$$

(-)

$$y = \sqrt{3|x|-9}$$

$$3|x|-9 \geq 0 \Rightarrow |x| \geq 3 \Rightarrow |x| \geq 3$$

$$D_f = (-\infty, -3] \cup [3, +\infty)$$

(2)

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$$y = \sqrt{\frac{|u|+1}{|u|-1}}$$

$$|u|-1 \neq 0 \Rightarrow |u| \neq 1 \Rightarrow u \neq \pm 1 \quad (\text{الف}) \quad \checkmark$$

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

$$y = \sqrt{\frac{\sqrt{u}+1}{\sqrt{u}-1}}$$

$$\sqrt{u}-1 \neq 0 \Rightarrow \sqrt{u} \neq 1 \Rightarrow u \neq 1 \quad (\text{ب}) \quad \checkmark$$

$$D_f = [0, 1) \cup (1, +\infty) \setminus \{1\} = (0, +\infty) - \{1\}$$

$$\text{ج) } y = \frac{\sin u}{\cos u - 1} = \tan u \quad (\neq 0 \Rightarrow \cos u \neq \frac{1}{2} = \cos(\frac{\pi}{3})) \quad \text{د) } \checkmark$$

$$u \neq 2k\pi \pm \frac{\pi}{3} \quad (k \in \mathbb{Z})$$

$$D_f = \mathbb{R} - \{2k\pi \pm \frac{\pi}{3} \mid k \in \mathbb{Z}\}$$

$$\text{هـ) } \frac{\cos u + 1}{\sin u + 1}$$

$$\sin u + 1 \neq 0 \Rightarrow \sin u \neq -1 = \sin(-\frac{\pi}{2})$$

$$u \neq 2k\pi - \frac{\pi}{2} \quad u \neq 2k\pi + \pi - (-\frac{\pi}{2})$$

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

$$\text{و) } y = \frac{\tan u + 1}{\cot u - 1} = \tan u \quad u \neq k\pi \pm \frac{\pi}{4}$$

$$u \neq k\pi \pm \frac{\pi}{4}$$

$$u \neq k\pi$$

$$D_f = \mathbb{R} - (\{k\pi \mid k \in \mathbb{Z}\} \cup \{k\pi \pm \frac{\pi}{4} \mid k \in \mathbb{Z}\})$$

$$\cot u - 1 \neq 0 \Rightarrow \cot u \neq 1$$

$$u \neq k\pi \pm \frac{\pi}{4}$$

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$$y = \frac{1}{\sqrt{r|a-r| - \frac{1}{r}}} = r|a-r| - \frac{1}{r} > 0 \Rightarrow r|a-r| > \frac{1}{r} \quad (9)$$
$$a-r > \frac{1}{r} \Rightarrow a > \frac{r}{2} \quad D_f = (-\infty, \frac{r}{2}) \cup (\frac{r}{2}, +\infty)$$

$$\text{ii) } y = \sqrt{\varepsilon - r|a|}$$

$$r - r|a| \geq 0 \Rightarrow r|a| \leq r \Rightarrow a \leq r \quad D_f = (-r, r)$$

$$\text{ii) } y = \sqrt{\frac{|a|}{a}} \Rightarrow \boxed{a \neq 0} \quad \frac{|a|}{a} > 0$$

$$(r|a|) \rightarrow \frac{1}{a} > 0 \Rightarrow a > 0$$

$$D_f = (0, +\infty)$$

$$\begin{aligned} &+ \checkmark \\ &0 < \rightarrow D_f = \mathbb{R} - \{0\} \\ &- \checkmark \end{aligned}$$

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$$(x-2)(x-3) > 0 \rightarrow \begin{array}{c} 2 \quad 3 \\ + \quad - \quad + \\ \hline \end{array} \rightarrow x < 2 \quad \text{یا} \quad x > 3$$

(الف)

$$(x-5)(x-1) < 0 \rightarrow \begin{array}{c} 1 \quad 5 \\ + \quad - \quad + \\ \hline \end{array} \rightarrow 1 < x < 5$$

(ب)

$$(x+5)(x+1) \geq 0 \rightarrow \begin{array}{c} -5 \quad -1 \\ + \quad - \quad + \\ \hline \end{array} \rightarrow x \leq -5 \quad \text{یا} \quad x \geq -1$$

(ج)

$$(x-4)(x-1) \leq 0 \rightarrow \begin{array}{c} 1 \quad 4 \\ + \quad - \quad + \\ \hline \end{array} \rightarrow 1 \leq x \leq 4$$

(د)

$$\frac{(x-1)(x-2)}{x-5} < 0 \rightarrow \begin{array}{c} 1 \quad 2 \quad 5 \\ - \quad + \quad - \quad + \\ \hline \end{array}$$

$$x < 1 \quad \text{یا} \quad 2 < x < 5$$

(الف)

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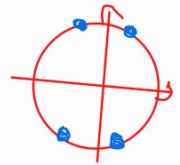
$$\frac{(x-1)(x+1)}{(x-5)(x-1)} \geq 0 \rightarrow \begin{array}{c} -1 \quad *1 \quad 5 \\ + \quad - \quad - \quad + \\ \hline \end{array}$$

$$x \leq -1 \quad \text{یا} \quad x > 5$$

(ب)

$$r \sin^2 \theta - r \neq 0 \rightarrow \sin^2 \theta \neq \frac{r}{r} \rightarrow \sin \theta \neq \pm \frac{\sqrt{r}}{r}$$

$$D_y = \mathbb{R} - \left\{ \theta \mid \theta = \pm \frac{\pi}{2} \right\}$$



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