

الف) $\frac{(n-1)^2 - x^2}{x(n-1)} \geq 0 \rightarrow \frac{x^2 + 1 - 2x - x^2}{x(n-1)} \geq 0 \rightarrow \frac{1-2x}{x(n-1)} \geq 0 \rightarrow \begin{cases} x=0 \\ x=1 \\ x=\frac{1}{2} \end{cases}$

ب) $\frac{x-2x-2}{x(n+1)} = \frac{-(n+2)}{x(n+1)} \rightarrow \begin{cases} x=-2 \\ x=0 \\ x=-1 \end{cases}$ $\rightarrow D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $\frac{x^2+2x-1}{(x-1)(x+2)} = \frac{kx+5}{(x-1)(x+2)} \rightarrow \begin{cases} x=-5/\epsilon \\ x=1 \\ x=-2 \end{cases} \rightarrow D_f = \mathbb{R} - \{-5/\epsilon, -2, 1\}$

الف) $x^2 - x^2 = 0 \rightarrow x^2 = x^2 \rightarrow x = -2$ $\frac{-2}{+} \frac{1}{-} \frac{5}{+} \rightarrow D_f = \mathbb{R} - (-2, 5)$

ب) $x-1 \geq 0 \rightarrow x \geq 1$ $\sqrt{y+1} = x - \sqrt{x-1} \rightarrow \begin{cases} x \geq \sqrt{x-1} \\ x \geq 1 \end{cases} \rightarrow D_f = [1, 12]$

$x^2 - x - 2 \geq 0 \rightarrow (x-2)(x+1) \geq 0 \rightarrow \frac{-1}{+} \frac{2}{+} \rightarrow (-\infty, -1) \cup (2, +\infty)$

$x^2 - 1 \geq 0 \rightarrow x^2 \geq 1 \rightarrow \begin{cases} x \geq 1 \\ x \leq -1 \end{cases} \rightarrow \mathbb{R} \rightarrow \text{منبع همواره مثبت}$

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

$\Delta \geq 0$
 $x^2 - 2ax - 1 = 0$
 $-2a = 1 \rightarrow a = -\frac{1}{2}$

$\rightarrow -x^2 - \frac{x}{2} + 1 = 0 \rightarrow -2x^2 - x + 2 = 0$

$x = \frac{1 \pm \sqrt{1+8}}{-2} \rightarrow \begin{cases} x = \frac{3}{2} = b \\ x = -2 \end{cases} \Rightarrow a+b = -\frac{1}{2} + \frac{3}{2} = 1$

$f(x) - x \geq 0 \rightarrow f(x) \geq x$

$\rightarrow x^2 - 2 \geq x \rightarrow x^2 \geq x+2 \rightarrow x \geq 1$

$\rightarrow x^2 + 3 \geq x \rightarrow x \geq -3$ $\rightarrow \begin{cases} x \geq -3 \\ x \geq 1 \end{cases} \rightarrow -3 \leq x < 1$

$\Rightarrow D_g = [-3, +\infty)$

$$\sin \frac{\pi}{\sqrt{e}} + \cos \sqrt{e} \pi = \sin 20^\circ + \cos 0^\circ = \frac{\sqrt{e}}{e} + 1 = \frac{e + \sqrt{e}}{e}$$

$$\rightarrow \frac{e(1 + \sqrt{e})^e}{e} - \frac{e(1 + \sqrt{e})}{e} = \frac{e + e + e\sqrt{e} - 1 - e\sqrt{e}}{e} = \frac{-1}{e}$$

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$$f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} \cdot \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a+1}{a-1}} = \frac{2a}{e} = a \rightarrow$$

برای هر مقدار از a در دامنه باشد تابع f بر خودش منطبق باشد

$$\frac{a+1}{a-1} \neq 1 \rightarrow a+1 \neq a-1 \rightarrow \begin{matrix} a \neq 1 \\ 1 \neq -1 \end{matrix} \leftarrow \begin{matrix} \text{خرج نباید منفرسد} \\ \text{همواره مقدر}$$

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

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$$x^2 - ex = -e$$

$$x^2 - ex + e = 0 \rightarrow (x - e)^2 = 0 \rightarrow x = e$$

$$\Rightarrow \sqrt{x^2 - 1} = e \xrightarrow{\text{توان}} x^2 - 1 = e \rightarrow x^2 = e + 1 \rightarrow x = \pm \sqrt{e + 1} = a$$

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$$\xrightarrow{x=1} f(1) = (1)^e - \omega(1) + 2 = 1 - \omega + 2 = e$$

$$\xrightarrow{x=-2} f(-2) = (-2)^e - \omega(-2) + 2 = 4e + 2e + 2 = 6e$$

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$$\rightarrow \forall x \in \mathbb{R} \quad 1 \leq f(x)$$

$$e \cos^e x + \omega \cos x = e \omega \xrightarrow{\cos x = t} et^e + \omega t - e\omega = 0$$

روش اول

$$t^e + \omega t - 1 = 0 \rightarrow (t + \omega)(t - 1) = 0$$

$$t = -\omega \rightarrow -\frac{\omega}{e} \quad -1 < \cos x < 1 \quad \text{نه}$$

$$t = 1 \rightarrow \frac{e}{e} = \cos x$$

$$\rightarrow \cos x = 1$$

$$x = 20^\circ \rightarrow f(e, \omega) = (\tan 20^\circ)^e = (\sqrt{e})^e = e$$

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