

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

$D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $\frac{x-2x-2}{x(x+1)} = \frac{-x-2}{x(x+1)} \rightarrow 1) \text{ صورت } \Rightarrow x \neq 0, -1$
 $\frac{3x+4+x-1}{(x-1)(x+1)} = \frac{4x+3}{(x-1)(x+1)} \rightarrow 2) \text{ مخرج } \Rightarrow \begin{cases} 4x+3 \neq 0 \Rightarrow x \neq -\frac{3}{4} \\ x \neq -1, 1 \end{cases} \Rightarrow$

الف) $((\frac{1}{3})^x - 9)(3^x - 4^x) \geq 0 \Rightarrow \frac{-1}{+ \frac{1}{-} - \frac{1}{+} +} \Rightarrow D_f = \mathbb{R} - (-2, 2, 5)$

$D_f = \mathbb{R} - \{-2, -\frac{5}{4}, 1, 2, 5\}$

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

2) $3 - \sqrt[4]{x-1} \geq 0 \Rightarrow 11 \geq x-1 \Rightarrow x \leq 12$

$\Rightarrow D_f = [1, 12]$

1) $x^2 - x - 2 > 0 \Rightarrow (x-2)(x+1) > 0 \Rightarrow \frac{-1}{+ \frac{1}{-} - \frac{1}{+} +} \Rightarrow x \in (-\infty, -1) \cup (2, +\infty)$

2) $x^2 - 1 \geq 0 \Rightarrow x \in (-\infty, -1] \cup [1, +\infty) \rightarrow 1 \cap 2 \Rightarrow D_f = (-\infty, -1) \cup (2, +\infty)$

به دلیل اینکه تابع max داراست و مقدارهای تعریف آن به شکل بازه است، عدد ابتدای و انتهایی بازه

if $x = -2 \Rightarrow 3 - 2a - 4 = 0 \Rightarrow a = -\frac{1}{2}$

if $x = b \Rightarrow 3 - \frac{1}{2}(b) - b^2 = 0 \Rightarrow b = -2, b = +1, 5$

دورینه تابع هستند پس:

$a + b = 1$

آن وقت دیگه نمیشه به شکل بازه نوشت
 غیق ق ق

$f(x) - x \geq 0 \rightarrow ① \text{ if } x \geq 1 \Rightarrow 3x - 2 = x \Rightarrow x = 1$

② if $x < 1 \Rightarrow 2x + 3 = x \Rightarrow x = -3 \Rightarrow \frac{-3}{- \frac{1}{+} + \frac{1}{+} +}$

$D_f = \mathbb{R} - (-\infty, -3)$

$$f\left(\sin \frac{\pi}{\sqrt{e}} + \cos \sqrt{e} \pi\right) = f\left(\frac{\sqrt{e}}{\sqrt{e}} + 1\right) = f\left(\frac{\sqrt{e} + \sqrt{e}}{\sqrt{e}}\right) = \sqrt{e} \left(\frac{\sqrt{e} + \sqrt{e}}{\sqrt{e}}\right)^{\sqrt{e}} - f\left(\frac{\sqrt{e} + \sqrt{e}}{\sqrt{e}}\right) =$$

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

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$$a = \frac{f(a)+1}{f(a)-1} \Rightarrow \frac{\frac{a+1}{a-1}+1}{\frac{a+1}{a-1}-1} = a \Rightarrow a = \frac{1a}{1} \Rightarrow a = a$$

$$a \in \mathbb{R} - \{1\}$$

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$$f(g(a)) = -\sqrt{e} \Rightarrow \text{if } g(a) = z \Rightarrow -\sqrt{e} = z^{\sqrt{e}} - \sqrt{e}z \Rightarrow (z - \sqrt{e})^{\sqrt{e}} = 0 \Rightarrow z = \sqrt{e}$$

$$z = g(a) = \sqrt{e} = \sqrt{a^{\sqrt{e}} - 1} \Rightarrow \sqrt{e} = a^{\sqrt{e}} - 1 \Rightarrow a = \pm \sqrt{\sqrt{e} + 1}$$

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$$\left. \begin{aligned} f(\sqrt{e}) &= 1 - \sqrt{e} + \sqrt{e} = \sqrt{e} \\ f(-\sqrt{e}) &= \sqrt{e} + 1 - \sqrt{e} = 1 \end{aligned} \right\} \Rightarrow f(\sqrt{e}) \times f(-\sqrt{e}) = 1 \times \sqrt{e}$$

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$$\sqrt{e} \cos^{\sqrt{e}} x + \sqrt{e} \cos x = \sqrt{e} \Rightarrow \sqrt{e} \cos^{\sqrt{e}} x + \sqrt{e} \cos x - \sqrt{e} = 0$$

$$\cos^{\sqrt{e}} x + \cos x - 1 = 0 \Rightarrow \cos x = -\frac{\sqrt{e}}{\sqrt{e}} \quad \text{or } \cos x = \frac{1}{\sqrt{e}} \Rightarrow x = \frac{\pi}{\sqrt{e}}$$

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$$\text{if } x = \frac{\pi}{\sqrt{e}} \Rightarrow f\left(\frac{\pi}{\sqrt{e}}\right) = \tan^{\sqrt{e}} \frac{\pi}{\sqrt{e}} \Rightarrow f\left(\frac{\pi}{\sqrt{e}}\right) = \sqrt{e}$$