

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

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

$\rightarrow x+1 \neq 0 \rightarrow x \neq -1, x \neq 0, x-1 \neq 0 \rightarrow x \neq 1, x+2 \neq 0 \rightarrow x \neq -2$

$\frac{2}{x-1} + \frac{1}{x+2} \neq 0 \rightarrow \frac{2(x+2) + (x-1)}{(x-1)(x+2)} \neq 0 \rightarrow \frac{3x+3}{(x-1)(x+2)} \neq 0$

$\rightarrow D_f = \mathbb{R} - \{-2, -\frac{3}{5}, -1, 0, 1\}$

الف) $\left(\left(\frac{1}{3}\right)^x - 9\right)(32 - 2^x) \geq 0$ $\left(\frac{1}{3}\right)^x - 9 = 0 \rightarrow \left(\frac{1}{3}\right)^x = 3^2 \rightarrow x = -2$

$32 - 2^x = 0 \rightarrow 2^{5-x} = 2^0 \rightarrow x = \frac{5}{2}$

$\rightarrow \frac{-2}{+} \frac{5/2}{-} \rightarrow D_f = (-\infty, -2] \cup [\frac{5}{2}, +\infty)$

ب) $\sqrt[3]{x-1} + \sqrt{y+1} = 3 \rightarrow \sqrt{y+1} = 3 - \sqrt[3]{x-1}$

$x-1 \geq 0 \rightarrow x \geq 1, 3 - \sqrt[3]{x-1} \geq 0 \rightarrow \sqrt[3]{x-1} \leq 3 \rightarrow x-1 \leq 27 \rightarrow x \leq 28$

$\rightarrow D_f = [1, 28]$

$x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0 \rightarrow \frac{-1}{+} \frac{2}{-}$

$x^2 - 1 \geq 0 \rightarrow x^2 \geq 1 \rightarrow x \geq 1, x \leq -1$

$\sqrt{x^2-1} + 1 \neq 0$ همیشه مثبت

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

$3 + a - x^2 \geq 0$ if $x = \frac{1}{2}$ $-3 + 2a + 3 = 0 \rightarrow a = \frac{1}{2}$

$-x^2 + \frac{x}{2} + 3 = 0 \rightarrow x^2 - \frac{x}{2} - 3 = 0 \rightarrow x = 2, x = -\frac{3}{2}$

$-x^2 - \frac{x}{2} + 3 = 0 \rightarrow x^2 + \frac{x}{2} - 3 = 0 \rightarrow x = -\frac{3}{2}, x = 2$

$x^2 + x - 12 = 0 \rightarrow x = -4, x = 3$

چون نامی دست حل کردی
یعنی ارفاق ← دمی دست سوال را انتخاب نونتی

$a+b = -1$

تابع درازنی تمام اعداد ماضی دینولتر از یک ناسقی است
 تابع درازنی اعداد کچیلتر از سقی سه منفی می شود

if $x \geq 1 \rightarrow g(x) = \sqrt{2x-2}$

if $x < 1 \rightarrow g(x) = \sqrt{x+3}$

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

$f(\underbrace{\sin \frac{\pi}{4}}_{=\frac{\sqrt{2}}{2}} + \underbrace{\cos 2\pi}_{=1}) = f(1 + \frac{\sqrt{2}}{2}) = 2(1 + \frac{\sqrt{2}}{2})^2 - 4(1 + \frac{\sqrt{2}}{2}) = 2 + 2\sqrt{2} + \frac{2}{2} - 4 - 2\sqrt{2} = -1$
 $\rightarrow = -\frac{1}{2}$

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

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

درازی تمامی مقادیر a تابع برقرار است فقط عرج نباید صفر باشد
 $a \neq 1$

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

$g(a) = \sqrt{a^2-1} = t \quad f(g(a)) = t^2 - \epsilon t = -\epsilon \rightarrow t^2 - \epsilon t + \epsilon = 0 \rightarrow (t-2)^2 = 0 \rightarrow t=2$

$-t=2 = \sqrt{a^2-1} \rightarrow a^2-1 = \epsilon \rightarrow a^2 = \delta \rightarrow a = \pm\sqrt{\delta}$

$f(x+3) = x^2 - 5x + 4 = (x-2)(x-3) \rightarrow f(x) = (x-5)(x-4)$

$f(-3) = (-1)(-4) = 4$
 $f(\epsilon) = (-1)(-2) = 2$
 $f(\epsilon) \times f(-3) = 2 \times 4 = 8$

$\epsilon \cos^2 x + \delta \cos x = 3, \delta \rightarrow \epsilon \cos^2 x + \delta \cos x - 3, \delta = 0 \rightarrow \cos x = \frac{-\delta \pm \sqrt{\delta^2 + 5\epsilon}}{2}$

$\rightarrow \cos x = \frac{1}{4} \quad / \quad (x = \frac{\pi}{4}) \rightarrow \tan^2 \frac{\pi}{4} = 1$

$\rightarrow \cos x = -\frac{1}{\epsilon} \quad (-1 \leq \cos x \leq 1)$

۴- ۲- و b باید ریشه های عبارت زیر را پیدا باشند بنابراین: $a = -\frac{1}{r}$ $-2a - 1 = 0$

$$f(n) = \sqrt{3 - \frac{n}{r} - n^2} \rightarrow -n^2 - \frac{n}{r} + \frac{3}{r} = 0 \rightarrow n = \left(\frac{1}{r} \pm \sqrt{\frac{1}{r^2} + 12} \right) \times \frac{1}{r}$$

بر $n = -2$
 $\hookrightarrow n = \frac{3}{r} \rightarrow b = \frac{3}{r}$

$$a + b = -\frac{1}{r} + \frac{3}{r} = 1$$