

(ب) $x-1 \neq 0 \Rightarrow x \neq 1$
 $x+1 \neq 0 \Rightarrow x \neq -1$
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 $x \neq 0$
 $\frac{x^2}{x-1} + \frac{1}{x+1} \neq 0 \Rightarrow \frac{x^2+x-1}{x^2+x-1} \neq 0$
 $D_f = \mathbb{R} - \left\{ -1, -\frac{1}{2}, 1 \right\}$
 $x \neq \frac{1}{2}$
 $\frac{x-1}{x} - \frac{x}{x-1} \geq 0$
 $\frac{x^2-1-x^2}{x(x-1)} = \frac{-1-x}{x(x-1)} \geq 0$
 $D_f = (-\infty, -1) \cup \left[\frac{1}{2}, 1 \right]$

$x-1 \geq 0 \Rightarrow x \geq 1$
 $\sqrt{y+1} = 3 - \sqrt{n-1} \Rightarrow \sqrt{n-1} \geq 0$
 $n-1 \leq 9 \Rightarrow n \leq 10$
 $y+1 = 9+n-1-4\sqrt{n-1}$
 $y = 7-4\sqrt{n-1} \Rightarrow n \geq 1 \Rightarrow n \in [1, 10]$
 $\left(\left(\frac{1}{3} \right)^x - 9 \right) (3^x - 4^x) \geq 0$
 $\frac{-2}{3} \leq x \leq 2$
 $D_f = (-\infty, -1] \cup [2, +\infty)$

$x^2 - x - 2 > 0 \Rightarrow (x-2)(x+1) > 0$
 $\sqrt{x^2-1} \cup x^2-1 \geq 0 \Rightarrow x^2 \geq 1 \Rightarrow x \geq 1, x \leq -1$
 $x \neq 0 \Rightarrow x \neq 1, x \neq -1$
 $D_f = (-\infty, -1) \cup [2, +\infty)$

$x^2 - 2x - 3 = 0 \Rightarrow x = 3, x = -1$
 $\sqrt{-x^2 - \frac{1}{x} + 3} \geq 0 \Rightarrow -x^2 - \frac{1}{x} + 3 \geq 0$
 $\Delta = \frac{1}{x} + 12, \frac{49}{x} \Rightarrow \frac{-6 \pm \sqrt{4}}{2} = -2, 3$
 $a+b \leq \frac{1}{x} + \frac{3}{x} \leq 1$

$f(x) - x \geq 0 \Rightarrow x \geq 1 \Rightarrow 3x-2-x = 2x-2 \geq 0 \Rightarrow x \geq 1$
 $x < 1 \Rightarrow 2x+3-x = x+3 \geq 0 \Rightarrow x \geq -3$
 $D_f = [-3, +\infty)$

$$f\left(\frac{\sqrt{x}}{x} + 1\right) \rightsquigarrow 1\left(1 + \frac{\sqrt{x}}{x}\right)^2 - 4\left(1 + \frac{\sqrt{x}}{x}\right)$$

$$1 + \frac{x}{x} + \cancel{1\sqrt{x}} - 4 - \cancel{1\sqrt{x}} = \boxed{-\frac{1}{x}} \quad \text{د}$$

$$f(x) \neq 0 \quad n-1 \neq 0 \rightarrow n \neq 1$$

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

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

$$f(f(a)) \rightarrow$$

من اول محاسبه می کنم

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

$$2x^2 - 4x = -4 \rightsquigarrow 2x^2 = 4x - 4 \rightsquigarrow x^2 = 2x - 2 \quad \begin{matrix} I \rightsquigarrow -\sqrt{2x-2} \\ II \rightsquigarrow +\sqrt{2x-2} \end{matrix}$$

$$I \Rightarrow \sqrt{x^2-1} = \sqrt{2x-2} \rightsquigarrow x^2-1 = 2x-2$$

$$II \Rightarrow \sqrt{x^2-1} = -\sqrt{2x-2} \quad x^2-2x+1=0 \rightsquigarrow \boxed{x=1}$$

به ازای $a=1$ عبارت تعریف نشده می شود!

$$x=1 \rightsquigarrow f(1) = 1 - 4 + 4 = 1 \quad \left\{ \begin{array}{l} x=-4 \rightsquigarrow f(-4) = 16 - 4 + 4 = 16 \\ \sqrt{16} = 4 \end{array} \right.$$

$$f(1) \times f(-4) = 1 \times 16 = \boxed{16} \quad \text{د}$$

$$2\cos^2 \alpha + 5\cos \alpha = 3 \rightsquigarrow \cos \alpha = \frac{1}{2} \Rightarrow \alpha = 90^\circ \quad \text{یا} \quad \alpha = 330^\circ$$

$$f(330) = \tan^2 30 \rightarrow f(330) = (\frac{1}{\sqrt{3}})^2 = \boxed{\frac{1}{3}}$$

ب-۲) $\sqrt[n]{x-1} + \sqrt{y+1} = 3$, $\sqrt{y+1} = 3 - \sqrt[n]{x-1} \rightarrow 3 - \sqrt[n]{x-1} \geq 0 \rightarrow \sqrt[n]{x-1} \leq 3 \rightarrow x \leq 28$ I

$\downarrow$
 $x-1 \geq 0 \rightarrow x \geq 1$ I

I, II $\rightarrow 1 \leq x \leq 28 \rightarrow Df = [1, 28]$

۳- $\log_e x^{x^2-n-2} \rightarrow x^{x^2-n-2} > 0 \rightarrow (x-2)(x+1) > 0$ $\frac{-1}{+} \frac{2}{-}$ $\rightarrow x > 2 \leq x < -1$ I

$\sqrt{x^2-1} + 1 \rightarrow$ هواره مثبت است $\rightarrow \sqrt{x^2-1} \rightarrow x^2-1 \geq 0 \rightarrow x \geq 1 \leq x \leq -1$ II

I, II $\rightarrow x < -1, x > 2 \rightarrow Df = (-\infty, -1) \cup (2, +\infty)$

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

$x \in Df \rightarrow x \in \mathbb{R} - \{1\}$

پس به ازای تمامی نقاط در دایره f بهتر است

$f(c \cdot s^n + d \cdot sn) = f(r, 0) \rightarrow c \cdot s^n + d \cdot sn = r, 0 \rightarrow c \cdot s^n + d \cdot sn = \frac{r}{r} = 1$ -10

$C \cdot sn = \frac{-d \pm \sqrt{d^2 + d^4}}{\lambda} \rightarrow C \cdot sn = \frac{-d+9}{\lambda} = \frac{1}{r}$

$\hookrightarrow C \cdot sn = \frac{-d-4}{\lambda} = -\frac{r}{2} \times C \cdot sn \geq -$

ملاحظه: $C \cdot s \frac{r}{r} = \frac{1}{r}$, $C \cdot s \frac{d}{r} = \frac{1}{r} \rightarrow f(r, 0) = 3$

$\downarrow$ بانه $= (\sqrt{r})^r = r$ $\downarrow$ بانه $= (-\sqrt{r})^r = r$