

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

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

$$\text{ب) } x \neq -1, 0, 1, -2, \quad \frac{x}{x-1} + \frac{1}{x+2} \neq 0 \Rightarrow \frac{x^2 + 9 + x - 1}{x^2 + x - 2} \neq 0 \Rightarrow$$

$$x \neq -\frac{9}{4}$$

$$D_f = \mathbb{R} - \{-1, 0, -2, -\frac{9}{4}\}$$

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

$$\text{ب) } x-1 \geq 0 \Rightarrow x \geq 1 \quad D_f = [1, \infty)$$

$$\sqrt[3]{y+1} = 3 - \sqrt[3]{x-1} \rightarrow \text{باید عددی باشد} \rightarrow \sqrt[3]{x-1} \leq 3 \rightarrow x-1 \leq 27 \rightarrow x \leq 28$$

عدد صحیح

$$D_f \subseteq [1, 28]$$

$$x^2 - x - 2 > 0 \quad \frac{-1 \pm 2}{+ \phi - \phi +}$$

$$x^2 - 1 \geq 0 \quad \frac{-1 \pm 1}{+ \phi - \phi +}$$

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

$$\sqrt{x^2 - 1} + 1 \neq 0 \quad \checkmark$$

$$-x^2 + ax + 3 = -(x+2)(x-b) = -x^2 - (2-b)x + 2b \Rightarrow$$

$$2b = 3 \Rightarrow b = 1/2$$

$$-(2-b) = a \Rightarrow a = -3/2 \quad b+a = 1/2 - 3/2 = -1$$

$$f(x) - x \geq 0 \xrightarrow{x \geq 1} 3x - 2 - x \geq 0 \quad x \geq 1$$

$$\xrightarrow{x \leq 1} 2x + 3 - x \geq 0 \quad x \geq -3$$

$$D_f = [-3, \infty)$$

$$\sin \frac{\pi}{2} + \cos 2\pi = \frac{\sqrt{3}}{2} + 1$$

راه ساده تر هم داشت ...!

$$2 \left(\frac{\sqrt{3}+2}{2} \right)^2 - 4 \left(\frac{\sqrt{3}+2}{2} \right) = \frac{3+4\sqrt{3}+4}{2} - 2\sqrt{3}-4 =$$

$$3/2 + 2\sqrt{3} - 2\sqrt{3} - 4 = -5/2$$

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

$a \neq 1$

معین کمالی نمی شود

$$\left(\frac{a+1}{a-1} \right) - 1 \quad a \neq 1$$

$$\frac{2a}{\frac{a-1}{2}} = a \Rightarrow \frac{2a}{2} = a$$

$$R - \{1\}$$

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$$g(a) = \sqrt{a^2-1}, \quad f(g(a)) = (\sqrt{a^2-1})^2 - 4\sqrt{a^2-1} = -4$$

$$t^2 - 4t + 4 = 0 \Rightarrow t = 2 \Rightarrow \sqrt{a^2-1} = 2 \Rightarrow a^2-1 = 4 \Rightarrow a^2 = 5$$

$$a = \pm \sqrt{5}$$

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$$f(f) = f(1+3) = 1-5+9 = 2$$

$$f(-2) = f(-9+3) = 39+30+9 = 72$$

$$f(f) \times f(-2) = 2 \times 72 = 144$$

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$$4 \cos^2 m + 5 \cos n = 3/5 \quad 4t^2 + 5t - \frac{3}{5} = 0$$

$$\underline{a \times c} \rightarrow 4t^2 + 5t - 12 = 0 \rightarrow t = \frac{-5}{4} \quad \text{خوب نیست}$$

$$\rightarrow t = \frac{3}{4} \cos a = \frac{1}{2} \Rightarrow a = 2k\pi \pm \frac{\pi}{3}$$

$$\tan^2(90^\circ) = (\sqrt{3})^2 = 3$$

۹۰°, ۳۰۰°

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ب-۲) $\sqrt{x-1} + \sqrt{y+1} = 2$, $\underbrace{\sqrt{y+1}}_{\text{مقدار مثبت}} = \underbrace{2 - \sqrt{x-1}}_{\text{مقدار مثبت!}} \rightarrow 2 - \sqrt{x-1} \geq 0 \rightarrow \sqrt{x-1} \leq 2 \rightarrow x \leq 5$

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

I, II $\rightarrow 1 \leq x \leq 5 \rightarrow \text{Def } [1, 5]$

$f(n) = 2^n - 2n = 2^n - 2n + 2 - 2 = 2(n^2 - 2n + 1) - 2 = 2(n-1)^2 - 2$ -4

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