

$$\begin{aligned} x^2 + ax - x^2 &\geq 0 \rightarrow \frac{-a}{2} + \frac{b}{2} \\ x = -y &\rightarrow x^2 + ax(-y) - f = 0 \rightarrow ya = -1 \rightarrow a = -\frac{1}{y} \\ \rightarrow x^2 + (-\frac{1}{y})x - x^2 = f(x) &\rightarrow x = b \rightarrow y + \frac{b}{y} - b^2 = 0 \\ \rightarrow (b+y)(b+\frac{y}{b}) = 0 &\rightarrow b = -y \text{ or } b = \frac{y}{b} \rightarrow b + a = \frac{y}{y} + \frac{1}{y} = 1 \end{aligned}$$

$$\begin{aligned} f(x) - x &\geq 0 \rightarrow \begin{cases} x < 1 \rightarrow yx + y - x > 0 \rightarrow x > -y \rightarrow x > -y \\ x > 1 \rightarrow yx - y - x > 0 \rightarrow x > 1 \rightarrow x > 1 \end{cases} \\ \rightarrow D_f &= [-y, +\infty) \end{aligned}$$

$$\begin{aligned} \sin \frac{\pi}{y} + \cos y\pi &= \frac{\sqrt{y}}{y} + 1 \quad f(x) = yx(x-y) \\ f(\frac{\sqrt{y}}{y} + 1) &= y(\frac{\sqrt{y}}{y} + 1)(\frac{\sqrt{y}}{y} + 1 - y) = y(\frac{\sqrt{y}}{y} + 1)(\frac{\sqrt{y}}{y} - 1) = \alpha \\ y(\frac{y}{y} - 1) &= -\frac{1}{y} \end{aligned}$$

$$\begin{aligned} f(f(a)) &= f(\frac{a+1}{a-1}) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{2a}{a-1}}{\frac{2}{a-1}} = a \\ \rightarrow f(f(a)) &= a \quad a \neq 1 \Leftrightarrow a \in \mathbb{R} - \{1\} \end{aligned}$$

$$\begin{aligned} f(g(a)) &= f(\sqrt{a^2 - 1}) \\ f(x) = x^2 - x &\rightarrow x^2 - x = -x \rightarrow x - x^2 = (x-y)^2 = 0 \\ \rightarrow x = y &\rightarrow g(a) = y \rightarrow \sqrt{a^2 - 1} = y \rightarrow a = \pm \sqrt{y^2 + 1} \end{aligned}$$

$$\begin{aligned} f(x+y) &= x^2 - (x+y) + 4 = (x-y)(x-y) - 1 \\ f(x) * f(y) &= (-y)x(-1) * (-1)x(-4) = 4xy \\ x+y = x &\rightarrow y = 0 \rightarrow x = -4 \end{aligned}$$

$$\begin{aligned} \cos^2 x + \cos^2 x &= \frac{y}{y} \\ \cos x(\cos x + 1) &= \frac{y}{y} \\ \cos^2 x + \cos x - \frac{y}{y} &= 0 \\ \cos^2 x + \cos x - 1 &= 0 \\ (\cos x + \frac{y}{y})(\cos x - \frac{y}{y}) &= 0 \end{aligned}$$

$$\begin{aligned} \cos x &= -\frac{y}{y} \text{ غلط} \\ \cos x &= \frac{1}{y} \checkmark \rightarrow f(y, a) = (\sqrt{y})^2 = y \\ x &= y \text{ km} \pm \frac{\pi}{2} \end{aligned}$$

$$(الف) \sqrt{\frac{(x-1)^2 - x^2}{(x-1)x}} = \sqrt{\frac{x^2 - 2x + 1 - x^2}{(x-1)x}} = \sqrt{\frac{-2x+1}{(x-1)x}} \quad (1) \quad (1, \infty)$$

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

$$\begin{aligned} x+1 &\neq 0 \Rightarrow x \neq -1 \\ x &\neq 0 \\ x-1 &\neq 0 \rightarrow x \neq 1 \\ x+2 &\neq 0 \rightarrow x \neq -2 \end{aligned}$$

$$\frac{x}{x-1} + \frac{1}{x+2} \neq 0 \Rightarrow$$

$$\frac{x^2 + x + x - 1}{x^2 + x - 2} \neq 0 \Rightarrow$$

$$x^2 + 2x - 1 \neq 0 \rightarrow x \neq \frac{-2 \pm \sqrt{4+4}}{2}$$

$$D_f = \mathbb{R} - \{0, -1, -2, \frac{-2 \pm \sqrt{4+4}}{2}\}$$

$$(الف) \frac{-2}{x} + \frac{5}{x} \quad D_f = (-\infty, -2] \cup [2, \infty)$$

$$\sqrt{y+1} = \sqrt{x-1} \Rightarrow x > 1, \quad \sqrt{x-1} > 0$$

$$D_f = [1, \infty)$$

$$\sqrt{x-1} < 2 \rightarrow x-1 < 4 \rightarrow x < 5$$

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

$$x^2 - 1 > 0 \rightarrow x > 1, \quad x < -1$$

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

عبارة جوی و ایت است!

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

$\frac{1}{x} \quad \frac{1}{x-1}$
 $\begin{array}{c} \bullet \quad \bullet \\ + \quad - \end{array} \quad \begin{array}{c} \bullet \quad \bullet \\ - \quad + \end{array}$ $\rightarrow D_f = (-\infty, 0) \cup [\frac{1}{x}, 1)$

3- $\log_{\epsilon} x^2 - x - 2 \rightarrow x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0$ $\frac{-1}{+} \frac{2}{-}$ $\rightarrow x > 2 \leq x < -1$ I

$\sqrt{x^2-1} + 1 \rightarrow$ جوار صبة است $\rightarrow \sqrt{x^2-1} \rightarrow x^2-1 > 0 \rightarrow x \geq 1 \leq x \leq -1$ II

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

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

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