

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

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

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

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

$$f(g(a)) = f(\sqrt{a^y - 1})$$

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

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

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

$$\begin{aligned}
 \cos x &= -\frac{y}{\omega} \text{ or } \frac{y}{\omega} \\
 \cos x &= \frac{1}{y} \sqrt{y} \rightarrow f(y, \omega) = (\sqrt{y})^y = y \\
 x &= y k \pi \pm \frac{\pi}{2}
 \end{aligned}$$

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

$$+ \frac{0}{x} - \frac{1}{x} + \frac{1}{x} -$$

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

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

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

$$x^2 + x - 1 \neq 0 \rightarrow x \neq \frac{-1 \pm \sqrt{5}}{2}$$

$$D_f = \mathbb{R} - \{0, -1, 1, -2, \frac{-1 \pm \sqrt{5}}{2}\}$$

$$(الف) \quad \frac{-2}{x} \quad \frac{0}{x} \quad D_f = (-\infty, -2] \cup [2, +\infty)$$

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

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

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

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

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

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