

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

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

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

$\hookrightarrow (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $\frac{3x^2 + 9x - 1}{(x-1)(x+2)} = \frac{x+2}{(x-1)(x+2)} \neq 0 \Rightarrow x \neq \frac{-2}{3}, -1, 0, 1$
 خرج من صفرين صفرين

٢) اكتب $((\frac{x}{2})^x - 9)(\sqrt{x} - x^x) \geq 0$
 $\downarrow \quad \downarrow$
 $x = -\frac{1}{2} \quad \sqrt{x} = x^x \rightarrow x = \frac{1}{4}$

$\frac{-1}{2} \quad \frac{1}{4}$
 $+ \quad - \quad +$

$(-\infty, -\frac{1}{2}] \cup [\frac{1}{4}, +\infty)$

ب) $\sqrt{x-1} + \sqrt{y+1} = x \quad \sqrt{y+1} = x - \sqrt{x-1}$

$x-1 > 0 \rightarrow x > 1$ I
 I, II $1 < x < 12$

$x-1 \geq 0 \rightarrow x \geq 1$ II

٣) $x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0$

$\frac{-1}{2} \quad 2$
 $+ \quad - \quad +$

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

$x^2 - 1 > 0 \quad x > 1 \rightarrow x > 1, x < -1$
 $\sqrt{x^2-1} \neq -1$

$\hookrightarrow (-\infty, -1) \cup (2, +\infty)$

٤) $[-1, b]$ صفرين

$-x^2 + ax + 1 = 0 \rightarrow a = -\frac{1}{x}$

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

$\Rightarrow b+a = 1$

$\frac{-1 \pm \sqrt{1+4}}{2} \checkmark \rightarrow \frac{1}{2}, \frac{3}{2}$

$b = \frac{3}{2}$

$$\begin{aligned}
 (c) \quad x > 1 &\rightarrow x^2 - 1 > x \rightarrow x > 1 \rightarrow [1, +\infty) \\
 x < 1 &\rightarrow x^2 + 1 > x \rightarrow x > -1 \Rightarrow (-1, 1) \\
 &\quad \hookrightarrow [-1, +\infty)
 \end{aligned}$$

$$\begin{aligned}
 (c) \quad \sin \frac{\pi}{\sqrt{x}} + \cos \pi &= \frac{\sqrt{x}+1}{\sqrt{x}} \rightarrow \frac{\sqrt{x}+1}{\sqrt{x}} \\
 \frac{x^2 - \varepsilon}{\sqrt{x} + \sqrt{x}} &\rightarrow x \left(\frac{x + \sqrt{x}}{x} \right) = \frac{x}{\sqrt{x}} \frac{\sqrt{x}+1}{\sqrt{x}} \\
 &\rightarrow \frac{x}{\sqrt{x}} \frac{x + \sqrt{x} + \varepsilon \sqrt{x}}{x} - \sqrt{x} - 1 = \frac{x + \sqrt{x} - \sqrt{x} - 1}{\sqrt{x}} = \boxed{-\frac{1}{\sqrt{x}}}
 \end{aligned}$$

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

$$\frac{1+a}{a-1}$$

$$\frac{1+a}{a-1} = a \rightarrow \frac{1+a}{a} = a \rightarrow a, \text{ any } a \neq 0$$

$$\text{or } a=1$$

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

$$\begin{aligned}
 (9) \quad f(x) &= 1 - x + y = 1 \quad f(-1) = 1 + 1 + y = 1 \\
 x + y &= 1
 \end{aligned}$$

$$(10) \quad F \cos \alpha + \Delta \cos \alpha = \mu, \Delta \xrightarrow{\times F} \quad \underbrace{\Delta \cos \alpha + 10 \cos \alpha - V = 0}$$

$$\rightarrow \cos \alpha + 10 \cos \alpha - 24 = 0 \rightarrow (\cos \alpha + 1F)(\cos \alpha - F) = 0$$

$$\underbrace{\cos \alpha = -10}_{\text{neg}} \quad \underbrace{\cos \alpha = F}_{\frac{F}{1} = \frac{1}{F}}$$

$$\cos \alpha = \frac{1}{F} \rightarrow \alpha = 90^\circ \rightarrow f(\mu, \alpha) = \tan \alpha = \sqrt{\mu} = (\mu)$$