

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

Sign chart for $\frac{-2x+1}{x(x-1)}$:

Interval	Sign
$(-\infty, 0)$	+
$(0, 1)$	-
$(1, \infty)$	+

Solution: $(-\infty, 0) \cup (1, \infty)$

ب) $\frac{3x+9+x-1}{(x-1)(x+2)} = \frac{4x+8}{(x-1)(x+2)} \neq 0 \Rightarrow x \neq \frac{-4}{4} = -1$

Sign chart for $\frac{4x+8}{(x-1)(x+2)}$:

Interval	Sign
$(-\infty, -1)$	+
$(-1, -2)$	-
$(-2, 1)$	+
$(1, \infty)$	-

Solution: $(-\infty, -1) \cup (-2, 1)$

(2) $((\frac{x}{2})^2 - 9)(x^2 - 4) \geq 0$

Sign chart for $(\frac{x^2}{4} - 9)(x^2 - 4)$:

Interval	Sign
$(-\infty, -2)$	+
$(-2, 2)$	-
$(2, \infty)$	+

Solution: $(-\infty, -2) \cup (2, \infty)$

ب) $\sqrt{x-1} + \sqrt{y+1} = 4$ $\sqrt{y+1} = 4 - \sqrt{x-1}$

Domain: $x-1 \geq 0 \Rightarrow x \geq 1$ and $y+1 \geq 0 \Rightarrow y \geq -1$

Sign chart for $4 - \sqrt{x-1} \geq 0$:

Interval	Sign
$(1, 17)$	+
$(17, \infty)$	-

Solution: $1 \leq x < 17$

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

Sign chart for $(x-2)(x+1)$:

Interval	Sign
$(-\infty, -1)$	+
$(-1, 2)$	-
$(2, \infty)$	+

Solution: $(-\infty, -1) \cup (2, \infty)$

(4) $[-1, b]$ with $-x^2 - 2ax + 4 = 0 \rightarrow a = -\frac{1}{2}$

Sign chart for $-x^2 - \frac{1}{2}x + 4 \geq 0$:

Interval	Sign
$(-\infty, -8)$	-
$(-8, 1)$	+
$(1, \infty)$ </tr	

Solution: $[-1, 1]$

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

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

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

$$\frac{1}{a-1} \cdot \frac{a+1}{a-1} = a \rightarrow \frac{1}{a-1} = a \rightarrow a = 1$$

$$\frac{1}{a-1} = a \rightarrow \frac{1}{a-1} = a \rightarrow a = 1$$

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

$$\begin{aligned}
 (9) \quad f(x) &= 1 - x + y = 1 \quad f(-1) = 1 + 1 + y = 2 \\
 x + y &= 1
 \end{aligned}$$

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

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

$$\begin{array}{ccc} \downarrow -1F & \downarrow F = 1 \\ \cos \alpha = -1 & \cos \alpha = 1 \end{array}$$

$$\cos \alpha = 1 \rightarrow \alpha = 0^\circ \rightarrow f(\mu, \alpha) = \tan \alpha = \sqrt{\mu} = (\mu)$$