

1

الف) $\frac{x-1}{x} - \frac{x}{x-1} \geq 0$

$\frac{x-1}{x} \geq \frac{x}{x-1}$

$D_f = (-\infty, 0) \cup (1, +\infty)$

$x < \frac{1}{x}$

$(x-1)^2 - x^2 \geq 0$

$x^2 - 2x + 1 \geq x^2 \rightarrow 2x \leq 1$

ب) $\frac{3}{x-1} + \frac{1}{x+2} \neq 0$

$\frac{3}{x-1} \neq -\frac{1}{x+2}$

$3x+4 \neq -x+1$

$4x \neq -5$

$x \neq -\frac{5}{4}$

$IR - \{-\frac{5}{4}\}$

2

الف) $((\frac{1}{x})^x - 9) \times (3x - 4x) \geq 0$

$(\frac{1}{x})^x - 9 = 0$

$(\frac{1}{x})^x = 9$

$x - x = 3x$

$x = -2$

$2x = 5$

$x = 2.5$

$\frac{-2}{+ \phi - \phi +}$

ب) $x-1 \geq 0$

$x \geq 1$

$x+1 \geq 0$

$x \geq -1$

$\sqrt{x-1} \leq 3$

$x-1 \leq 9$

$x \leq 10$

3

الف) $\log_f(x^2 - x - 2) > 0$

$x^2 - x - 2 > 0$

$(x-2)(x+1) > 0$

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

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

$\sqrt{x^2 - 1} \rightarrow x^2 - 1 \geq 0$

$(x-1)(x+1) \geq 0$

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

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

الف) $\log_f(x^2 - x - 2) > 0$

$x^2 - x - 2 > 0$

$(x-2)(x+1) > 0$

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

4

$x^2 - 3x + a = 0$

$3 - 2a - 4 = 0$

$-2a = 1$

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

$b = -b^2 - \frac{a}{1}b + 3 = 0$

$\Delta = (3)^2 - 4 \times (3) \times (-1)$

$\Delta = \sqrt{12, 25} \rightarrow 3, 5$

$\frac{-3 \pm 5}{2} = 1, 4$

$\frac{3}{2} - \frac{1}{2} = 1 = a+b$

5

الف) $\sin x \geq x$

$\cos x \geq 1$

$f(x) - x \geq 0$

$f(x) \geq x$

ب) $x^2 + 3x \geq x$

$x \geq 3$

$-3 \leq x < 1$

$[-3, +\infty)$

$$\sin \frac{\pi}{3} = \frac{\sqrt{3}}{2}$$

$$x^2 = 1^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + 2 \times 1 \left(\frac{\sqrt{3}}{2}\right) = 1 + \frac{3}{4} + \sqrt{3} \rightarrow x = \frac{\sqrt{3}}{2} + \sqrt{3}$$

$$\cos 2\pi = 1$$

$$2x^2 = \frac{3}{2} + 2\sqrt{3}$$

$$\frac{3}{2} + 2\sqrt{3} - 2\sqrt{3} = -\frac{1}{2}$$

$$f \times (1 + \frac{\sqrt{3}}{2}) = f + 2\sqrt{3}$$

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

بالا آن فرض کنیم $f(a) = 1$
 $\mathbb{R} - \{1\} \leftarrow \frac{a+1}{a-1} = 1$
 $a+1 = a-1$
 $2 = 0$ X

$$f(f(a)) = \frac{f(a)+1}{f(a)-1} \Rightarrow \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{\frac{a+1+a-1}{a-1}}{\frac{a+1-a-1}{a-1}} = \frac{\frac{2a}{a-1}}{\frac{0}{a-1}} = \frac{2a}{0} = \infty$$

$$f(a) - 1 \neq 0 \Rightarrow f(a) \neq 1$$

در $\mathbb{R}$ منتهی $f(a)$ می باشد

$$g(a) = \sqrt{a^2 - 1}$$

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

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

$$\sqrt{a^2 - 1} = x$$

$$x^2 - x + 4 = 0$$

$$\sqrt{a^2 - 1} = 2$$

$$(x-2)^2 = 0 \Rightarrow x = 2 \Rightarrow a = \pm \sqrt{5}$$

و $a-1 \geq 0 \Rightarrow a \geq 1$
 $a = \sqrt{5}$

$$x = -4 \quad f(-3) = 9 - (-3) + 4 = 16$$

$$x = 1 \quad f(2) = 1 - 2 + 4 = 3$$

$$f(2) \times f(-3) = 3 \times 16 = 48$$

$$f \cos^2 x + \Delta \cos x = 1/2$$

$$f \cos^2 x + \cos x - 1/2 = 0$$

$$\cos^2 x + \Delta \cos x - 1/2 = 0$$

$$\left(\cos - \frac{1}{f}\right) \left(\cos + \frac{1}{f}\right)$$

$$\cos = \frac{1}{f} \quad \cos = -\frac{1}{f} \times \frac{1}{f} \cos$$

$$\tan^2 = \frac{1}{\cos^2} - 1$$

$$\frac{1}{\frac{1}{f}} - 1 = f - 1 = 3$$

(الف-۱) $\frac{x-1}{x} - \frac{x}{x-1} \geq 0 \rightarrow \frac{(x-1)^2 - x^2}{x(x-1)} \geq 0 \rightarrow \frac{-x+1}{x(x-1)} \geq 0$

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

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

ب-۱) تمام ریشه های مقعرها نباید در دامنه باشند!

$x+1 \neq 0 \rightarrow x \neq -1 \quad ; \quad x \neq 0 \quad ; \quad x-1 \neq 0 \rightarrow x \neq 1$

$x+2 \neq 0 \rightarrow x \neq -2 \quad ; \quad \frac{x}{x-1} + \frac{1}{x+2} \neq 0 \rightarrow \frac{x^2+x+n-1}{(x-1)(x+2)} \neq 0 \rightarrow x+n+2 \neq 0 \rightarrow x \neq -\frac{n}{2}$

$D_f = \mathbb{R} - \left\{ -1, 0, 1, -2, -\frac{n}{2} \right\}$