

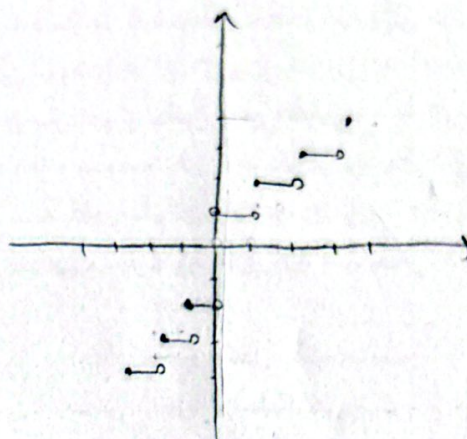
ان) $f(x) = 2 \sin^2(x + \frac{\pi}{4}) - 1 \rightarrow -1 \leq \sin^2 \leq 1 \rightarrow -1 \leq 2 \sin^2 - 1 \leq 1$

$R_f = [-1, 1]$

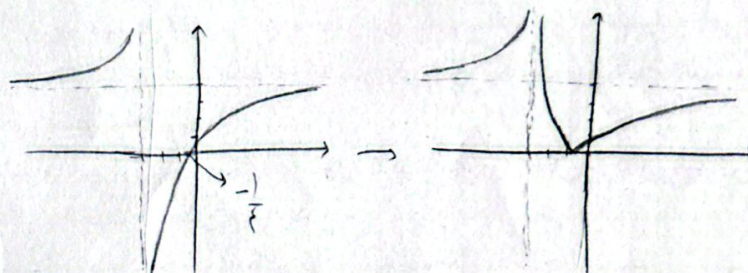
ب) $g(x) = 2 \cos^2 x - 1 \rightarrow -1 \leq \cos^2 \leq 1 \rightarrow -1 \leq 2 \cos^2 - 1 \leq 1$

$R_g = [-1, 1]$

$$y = \begin{cases} -1 - 2 = -3 & -5 \leq x < -2 \\ -1 - 2 = -3 & -4 \leq x < -1 \\ -1 - 1 = -2 & -1 \leq x < 0 \\ 1 + 1 = 2 & 0 \leq x < 1 \\ 1 + 2 = 3 & 1 \leq x < 2 \\ 1 + 2 = 3 & 2 \leq x < 3 \\ 1 + 3 = 4 & x = 3 \end{cases}$$



$y = \left| \frac{x+1}{x+3} \right|$

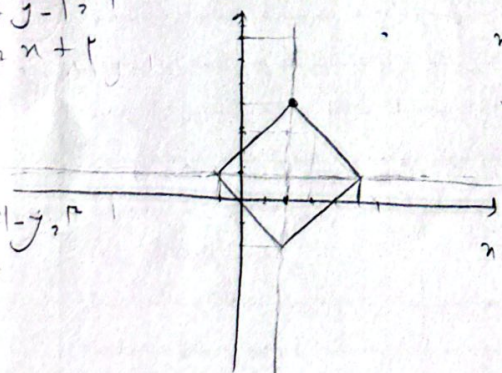


$x - y + 1 = 2$
 $y = x + 1$

$x - 2 + y - 1 = 2$
 $y = -x + 5$

$x - y + 1 = -2$
 $y = x + 3$

$x - 2 - y + 1 = -2$
 $y = x - 1$



ان) $f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}}$

$(\sqrt{x + \frac{1}{x}} + 1)^2 - 1 \xrightarrow{\sqrt{x + \frac{1}{x}} \geq 1}$

$x + \frac{1}{x} \geq 2 \xrightarrow{x \geq 1} \sqrt{x + \frac{1}{x}} \geq 1$

$(\sqrt{x + \frac{1}{x}} + 1)^2 - 1 \rightarrow R_f = [2 + 2\sqrt{2}, +\infty)$

$y = -\sin^2 x + 2\sin x + 2$
 $\begin{cases} 1 \rightarrow -1 + 2 + 2 = 3 \\ -1 \rightarrow -1 - 2 + 2 = -1 \\ 1 \rightarrow 1 \end{cases}$
 $R = [0, 4]$

$D_f = \{1, 2, 3, \omega, \gamma, \nu, \lambda, \theta\}$

$R_f = \left\{10 - \frac{1}{x}, 10 - \frac{2}{x}, 10 - \frac{3}{x}, \dots, 10 - \frac{9}{x}\right\}$

$(x) = 9 \times 10 - \left(\frac{1+2+\dots+9}{x}\right) = 90 - \frac{45}{x} = \gamma \omega$

$f(x) = \sqrt{bx+c}$

$\checkmark$ - تابع زیر را می‌توان نقطه‌ای در این فضا را در نظر گرفت

$f(x) = \sqrt{bx+c} \Rightarrow \begin{cases} x > 0 \\ b > 0 \\ c > 0 \end{cases}$

$f(x) = \sqrt{bx+c} \Rightarrow \begin{cases} x > 0 \\ b > 0 \\ c > 0 \end{cases} \quad g(x) = \sqrt{x^2 + t}$

$x^2 + t \geq t \rightarrow R_g = [t, +\infty)$

$f(x) = \frac{x^2 - (x)}{x+2} = \frac{x(x-1)(x+2)}{x+2} = x^2 - x \rightarrow R_f = [0, +\infty) = [-1, +\infty)$
 $G(x) = -1$

تنها محدودیت داده در این مسئله منجر است اما تابع این هم می‌باشد و در این ۲ مقدار به این ۱ فضا می‌رسد

$f\left(\frac{x-2}{-x}\right) = f(-1) = 1 + 2 = 3$

$x^2 - 2x = 1 \Rightarrow x^2 - 2x - 1 = 0$

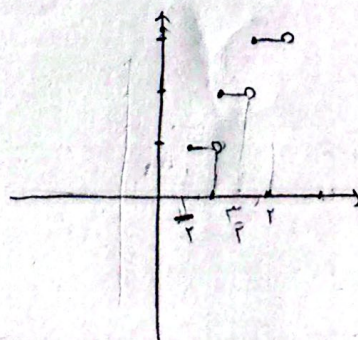
$(x-2)(x+2) = 0 \Rightarrow \begin{cases} x-2 = a \leq b \\ x+2 = a \leq b \end{cases}$

$y = \sqrt{x^2 + ax^2 + bx - 1} = \sqrt{(x-2)^2} = \sqrt{x^2 - 4x + 4 - 1} = \sqrt{x^2 - 4x + 3}$

$a = -4, b = 12 \Rightarrow D_f = [-4, 12]$

$y = x - 2 \rightarrow R_f = [-1, 0]$

$y = \begin{cases} 0 + 1 = 1 & 1 \leq x < 2 \\ 1 + 1 = 2 & 2 \leq x < \frac{5}{2} \\ 1 + 2 = 3 & \frac{5}{2} \leq x < 3 \end{cases}$



$1, 2, 3$ - فضا