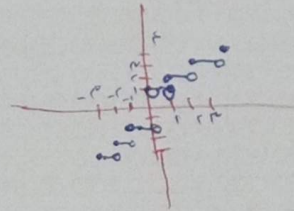


الف) $f(x) = 2 \sin^2\left(x + \frac{\pi}{4}\right) - 1 \Rightarrow 0 \leq \sin^2 x \leq 1 \rightarrow 0 \leq 2 \sin^2 x \leq 2 \rightarrow -1 \leq 2 \sin^2 x - 1 \leq 1$ ①
 $\rightarrow R_f: [-1, 1]$

ب) $g(x) = 3 \cos^2 x - 4 \rightarrow -1 \leq \cos^2 x \leq 1 \rightarrow -3 \leq 3 \cos^2 x \leq 3 \rightarrow -7 \leq 3 \cos^2 x - 4 \leq -1$
 $\rightarrow R_g: [-7, -1]$

$y = \frac{x}{|x|} + [x] \xrightarrow{x > 0} 1 + [x]$
 $\xrightarrow{x < 0} -1 + [x]$



$x = -5 \rightarrow y = -5$

$x = -1 \rightarrow y = -5$

$x = -5, 0 \rightarrow y = -5$

$x = -5, 0 \rightarrow y = -5$

$x = -5 \rightarrow y = -5$

$x \neq 0$

$x = -1, 0 \rightarrow y = -5$

$x = 0, 0 \rightarrow y = 1$

$x = 1 \rightarrow y = 5$

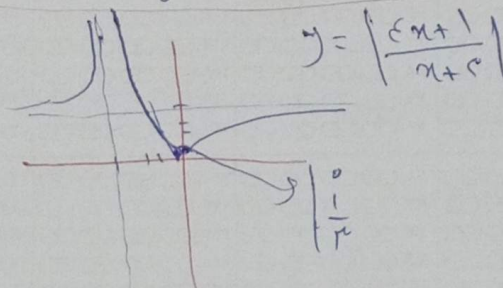
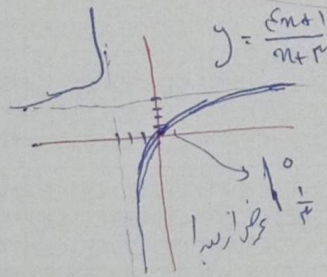
$x = 1, 0 \rightarrow y = 5$

$x = 5 \rightarrow y = 5$

$x = 5 \rightarrow y = 5$

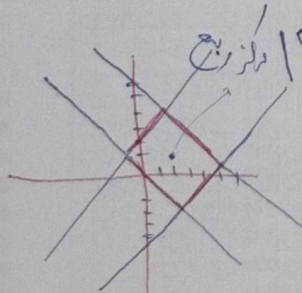
$x = 5, 0 \rightarrow y = 5$

$y = \left| \frac{x+1}{x+5} \right|$



$|x-5| + |y-1| = 5$ ②

$x-5+y-1=5 \Rightarrow x+y=11 \rightarrow y = -x+11$	$x \geq 5$	$y \geq 1$
$x-5+(-y)+1=5 \rightarrow y = x-9$	$x \geq 5$	$y < 1$
$(-x)+5+y-1=5 \rightarrow y = x+1$	$x < 5$	$y \geq 1$
$(-x)+5+(-y)+1=5 \rightarrow y = -x$	$x < 5$	$y < 1$



ج) $f(x) = \left(x + \frac{1}{x}\right)^a + \sqrt{x + \frac{1}{x}} = a + \sqrt{a} = (1 + \sqrt{a})^a - 1 = \left(1 + \sqrt{x + \frac{1}{x}}\right)^a - 1$ ③

$\min\left(x + \frac{1}{x}\right) = 2 \rightarrow \min\left(\sqrt{x + \frac{1}{x}}\right) = \sqrt{2} \rightarrow (1 + \sqrt{2})^a - 1 \geq 2 + 1 + \sqrt{2} - 1 = \frac{2 + \sqrt{2}}{\min(a)}$

$\rightarrow R_f: [2 + \sqrt{2}, +\infty)$

د) $y = (1 - \sin x)(1 + \sin x) = -\sin^2 x + \sin x + 1$ ④

$\sin x = 1 \rightarrow y = 1$
 $\sin x = -1 \rightarrow y = 0$
 $\sin x = \frac{1}{2} \rightarrow y = \frac{3}{4}$
 $\sin x = \frac{\sqrt{3}}{2} \rightarrow y = \frac{1}{4}$

$\rightarrow R_f: [0, 1]$

برای تلفظ و نشان کلاس (دارم) میسر ب کتب (95)

$$f(x) = \frac{x}{r} + 1 \quad D_f: \{1, 2, 3, 4, 5, 6, 7, 8, 9\} \Rightarrow \sum_{i=1}^{n=9} f(x_i) = \frac{-(1+2+\dots+9)}{r} + 9 \times 1$$

$$= \frac{-45}{r} + 9 = -15 + 9 = -6$$

$$f(x) = \sqrt{ax^2 + bx + c} \quad D_f: [r, +\infty) \Rightarrow a=0 \rightarrow f(x) = \sqrt{bx + c}$$

$$f(r) = 0 \rightarrow rb + c = 0 \rightarrow c = -rb \quad f(r) = 1 \rightarrow rb + \frac{r^2}{r} = 1 \rightarrow b = 1, c = -r$$

$$\Rightarrow f(x) = \sqrt{x - r}$$

$$g(x) = \sqrt{bx^2 + ax - rc} \quad \left. \begin{matrix} a=0 \\ b=1 \\ c=-r \end{matrix} \right\} \rightarrow g(x) = \sqrt{x^2 + x} \rightarrow \min g(x) = \sqrt{0+0} = \sqrt{0} = 0$$

$$\rightarrow R_g = [r, +\infty)$$

$$f(x) = \frac{x^r - rx}{x+r} = \frac{x(x^r - r)}{x+r} = \frac{x(x-r)(x+r)}{x+r} \xrightarrow{x \neq -r} x^r - rx$$

$$D_f: \mathbb{R} - \{a, b\} \quad \left. \begin{matrix} a = -r \\ b = -r \end{matrix} \right\}$$

$$R_f: [c, +\infty) - \{a\} \quad \min f(x): rx - r^2 \rightarrow x = 1 \rightarrow \min f(x) = 1 - r = -1 = c$$

$$R_f: [-1, +\infty) - \{a\} \rightarrow x^r - rx = 1 \rightarrow x^r - (x - 1) \rightarrow (x+1)(x-r)$$

$$\rightarrow \frac{a+b}{rc} = \frac{-r+r}{r(-1)} = \frac{0}{-r} = 0 \rightarrow f(-1) = \frac{-1+r}{(-1)+r} = \frac{r}{1} = r$$

$$y = \sqrt{x^r + ax^r + bx - 1} \rightarrow \text{مشتق} \rightarrow \text{مشتق}$$

$$\rightarrow y = \sqrt{(x-r)^r} \rightarrow (x-r)^r = x^r - rx^r + rx - 1$$

$$a = -r, b = +r$$

$$D_f: [-r, r]$$

$$f(x) = x - r$$

$$\rightarrow R_f: [-r, r]$$

$$y = \left[x \right] + \left[x + \frac{1}{r} \right] \quad D_f: \left[\frac{1}{r}, r \right]$$

$$x = \frac{1}{r} \rightarrow y = 1$$

$$x = 1 \rightarrow y = r$$

$$x = 1, r \rightarrow y = r$$

$$x = 1, a \rightarrow y = r$$

$$x = r \rightarrow y = r$$

