

$$-1 \leq \sin\left(x + \frac{\pi}{3}\right) \leq 1 \rightarrow 0 \leq \sin^2\left(x + \frac{\pi}{3}\right) \leq 1$$

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$$\rightarrow 0 \leq \sqrt{\sin^2\left(x + \frac{\pi}{3}\right)} \leq \sqrt{1} \rightarrow -1 \leq \sin\left(x + \frac{\pi}{3}\right) \leq 1$$

$$\rightarrow R_f = [-1, 1]$$

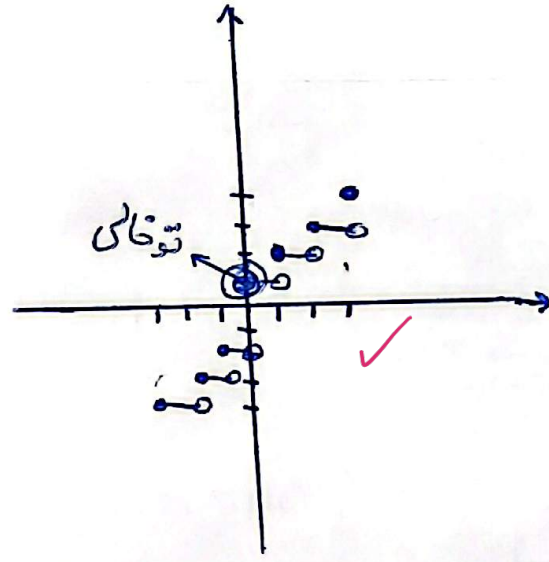
$$-1 \leq \cos x \leq 1 \rightarrow -1 \leq \cos^2 x \leq 1 \rightarrow -3 \leq \sqrt{\cos^2 x} \leq 3$$

$$\rightarrow -7 \leq \sqrt{\cos^2 x} - 4 \leq -1 \rightarrow R_f = [-7, -1]$$

$$\frac{x}{|x|} \xrightarrow{-3 < x < 0} -1 \quad , \quad \frac{x}{|x|} \xrightarrow{0 < x < 3} 1$$

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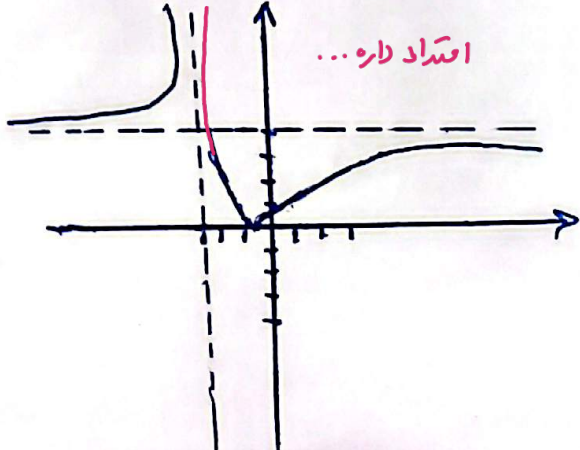
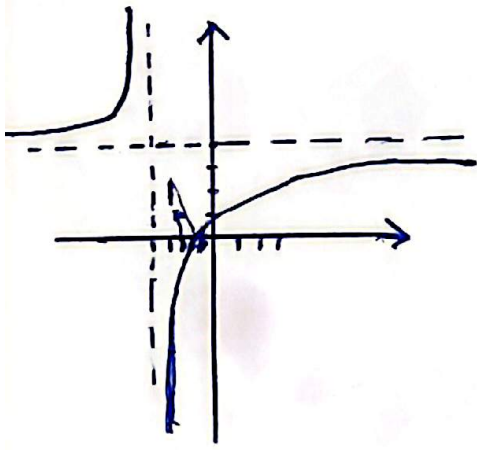
$$\begin{aligned} -3 < x < -2 &\rightarrow -1 - 3 = -4 \\ -2 < x < -1 &\rightarrow -1 - 2 = -3 \\ -1 < x < 0 &\rightarrow -1 - 1 = -2 \\ 0 < x < 1 &\rightarrow 0 + 1 = 1 \\ 1 < x < 2 &\rightarrow 1 + 1 = 2 \\ 2 < x < 3 &\rightarrow 2 + 1 = 3 \\ x = 3 &\rightarrow 3 + 1 = 4 \end{aligned}$$



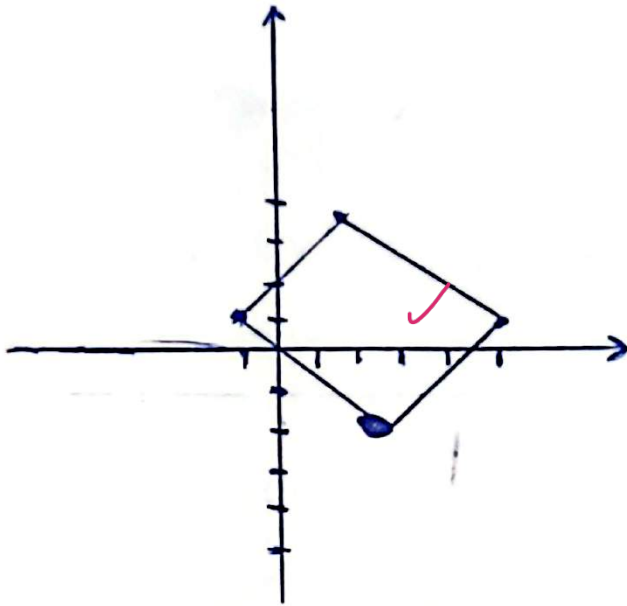
$$y = \frac{x+1}{x+3} \xrightarrow{x=0} \frac{1}{3} = y$$

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

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$$|x-2|+|y-1|=3 \rightarrow y = \begin{cases} -x+4 & ; x \geq 2, y \geq 1 \\ x-4 & ; x \geq 2, y < 1 \\ x+2 & ; x < 2, y \geq 1 \\ -x & ; x < 2, y < 1 \end{cases}$$



$f(x) = x + \frac{1}{x} + \sqrt{x}$
 $\min \square = \sqrt{2}, \quad \square = \sqrt{\frac{x}{x}}$
 $\square = \sqrt{\frac{x}{x}} \rightarrow y = \square^2 + \sqrt{2} \square$
 $f(x) \xrightarrow[-\infty]{+\infty} \infty$
 $R_f = [1 + \sqrt{2}, +\infty)$

$y = (1 - \sin x)(1 + \sin x) \rightarrow y = -\sin^2 x + \sin x + \frac{1}{4}$

$y = \begin{matrix} \sin x = -1 \\ -\frac{b}{a} = 1 \\ \sin x = 1 \end{matrix}$
 $R_f = [0, \frac{5}{4}]$

$$y = -\frac{1}{4}x + 10$$

$x=1$	$-\frac{1}{4} + 10$
$x=2$	$-\frac{2}{4} + 10$
$x=3$	$-\frac{3}{4} + 10$

-4

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$$\rightarrow \text{مجموع اعداد} = \underbrace{10+10+10+10+10+10+10+10+10}_{9(10)} - \frac{1}{4} \underbrace{(1+2+3+\dots+9)}_{45}$$

$$\rightarrow 90 - 15 = 75 \checkmark$$

✓ $a=0 \Leftarrow$ چون فقط 1 به بعد تعریف می شود پس دارای یک ریشه است

$$6x + c \xrightarrow{x=2} 12b + c = 0 \rightarrow 12b = -c \rightarrow -12b = c$$

$$f(3) = \sqrt{12b + c} = 1 \rightarrow 12b + c = 1 \Rightarrow \boxed{b=1} \Rightarrow \boxed{c = -12b = -12}$$

$$g(x) = \sqrt{(1)x^2 + (0)x - 1(-12)}$$

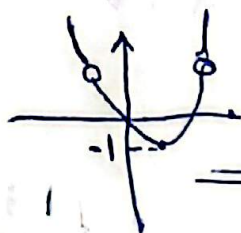
$$\rightarrow g(x) = \sqrt{x^2 + 12} \rightarrow \sqrt{x^2 + 12} \Rightarrow \boxed{P_g = [12, +\infty)}$$

$$f(x) = \frac{(x)(x-2)(x+2)}{x+2} \rightarrow f(x) = x^2 - 2x$$

$$\rightarrow x^2 - 2x \neq 1 \rightarrow x^2 - 2x - 1 \neq 0 \rightarrow (x-2)(x+1) \neq 0 \rightarrow \begin{cases} x \neq 2 \\ x \neq -1 \end{cases}$$

$$\rightarrow f(x) = x^2 - 2x$$

$$1 = -\frac{b}{2a} = x \rightarrow -1$$



$$\Rightarrow \boxed{c=1}$$

$$\boxed{a=-2} \quad \boxed{b=2}$$

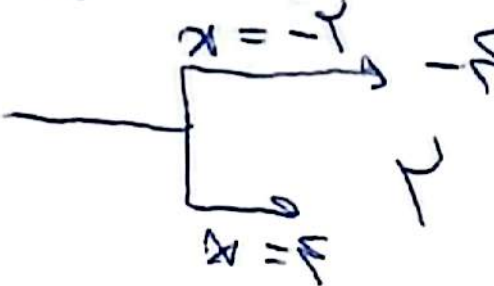
$$f\left(\frac{a+b}{2}\right) = f\left(\frac{-2+2}{2}\right) = f(0) = 0 \quad \text{or} \quad f(-1) = (-1)^2 - 2(-1) = 3 \checkmark$$

9. برای اینکه تابع خطی باشد باید به فرم $(x-2)^3$ باشد

$$\Rightarrow (x-2)^3 = x^3 + \cancel{ax^2} + \cancel{bx} - 1$$

$$\rightarrow x^3 - 2x^2 + 4x - 1 = x^3 + ax^2 + bx - 1$$

$$a = -2 \text{ و } b = 4$$

$$y = x - 2$$


$$R_f = [\cancel{-4}, 12]$$

چون عدد ثابت عبارت زیر را می‌کشد، -1 است پس حتماً $(x-2)^3$ بوده و داریم:

$$y = \sqrt{x^3 - 4x^2 + 12x - 1} \rightarrow a = -4, b = 12 \rightarrow D_y = [-4, 12]$$

$$x = -4 \rightarrow y = -1$$

$$x = 12 \rightarrow y = 10$$

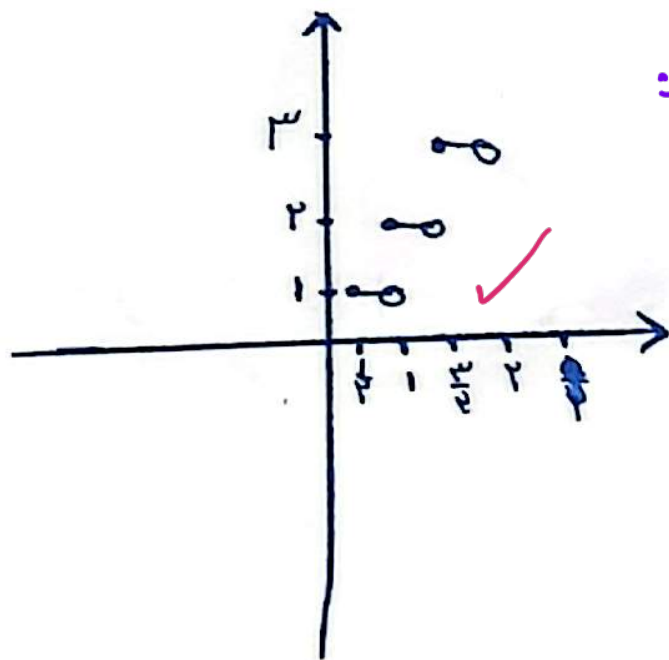
$$\rightarrow R_y = [-1, 10]$$

$$\frac{1}{2} \leq x < 1 \rightarrow 1 \leq x + \frac{1}{2} < \frac{3}{2} \rightarrow \frac{1}{2} \leq x < 1 \text{ و } 1 \leq x + \frac{1}{2} < \frac{3}{2}$$

$$1 \leq x < 2 \rightarrow 2 \leq x + \frac{1}{2} < \frac{5}{2} \rightarrow \frac{3}{2} \leq x + \frac{1}{2} < \frac{5}{2}$$

-10

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سه پار. خطی :

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