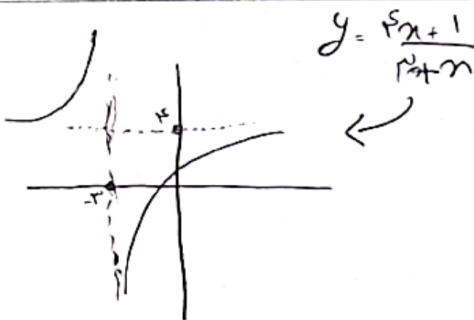


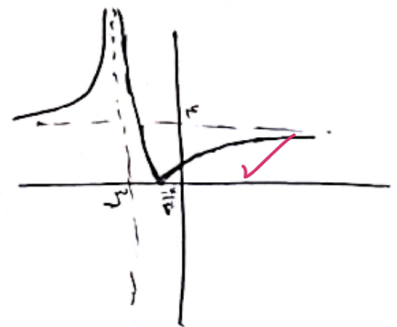
(الف) $0 \leq \sin^2 x \leq 1$
 $-1 \leq \sqrt{2} \sin x - 1 \leq 1$ $R_f = [-1, 1]$

(ب) $-1 \leq \cos^2 x \leq 1$
 $-1 \leq \sqrt{2} \cos x - 1 \leq 1$ $R_g = [-1, 1]$

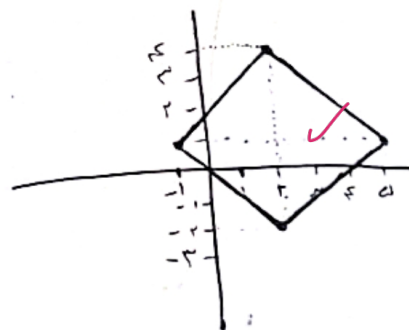
$-2 \leq x < -1 \rightarrow y = -4$
 $-1 \leq x < 0 \rightarrow y = -2$
 $0 \leq x < 1 \rightarrow y = 0$
 $1 \leq x < 2 \rightarrow y = 2$
 $2 \leq x < 3 \rightarrow y = 4$
 $x = 3 \rightarrow y = 4$



$y = \left| \frac{5x+1}{x+2} \right|$



$x \geq 2, y \geq 1 \rightarrow y = -x + 4$
 $x \leq 2, y \geq 1 \rightarrow y = x + 2$
 $x \geq 2, y \leq 1 \rightarrow y = x - 2$
 $x \leq 2, y \leq 1 \rightarrow y = -x$



$y = -\sin^2 x + \sqrt{2} \sin x + 1$
 $-1 \leq \sin x \leq 1$

$-\sin^2 x + \sqrt{2} \sin x + 1$
 $\sin x = -1$
 $\sin x = 0$
 $\sin x = 1$

$R_g = [0, 2]$

(الف) $x + \frac{1}{x} = t$ $2 \leq t \leq -2$
 $f(x) = t + \sqrt{2}t$ $t \geq 2$
 $t + \sqrt{2}t \geq 2 + \sqrt{2}$
 $R_f = [2 + \sqrt{2}, +\infty)$

$$-\frac{1}{3} \left(\frac{9 \times 10}{3} \right) + 10 \times 9 = 75 \checkmark$$

$$-\frac{1}{2}(1) + 10 = \frac{19}{2}$$

$$-\frac{1}{2}(5) + 10 = \frac{15}{2}$$

$$-\frac{1}{2}(9) + 10 = \frac{11}{2}$$

$$\frac{11}{2} + \frac{15}{2} + \dots + \frac{19}{2} = 75 \checkmark$$

همواره بزرگتر مساوی ۲ $\rightarrow a=0$ تابع خطی است

$$2b + c = 0$$

$$3b + c = 1$$

$$b = 1 \checkmark$$

$$c = -2$$

$$g(x) = \sqrt{x^2 + 4}$$

همواره بزرگتر مساوی ۲

$$Rg = [2, +\infty) \checkmark$$

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

$$y \neq 1 \Rightarrow x \neq -2, 1 \Rightarrow a = -2 \checkmark, b = 1 \checkmark \Rightarrow \text{تابع}$$

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

$$\sqrt{x^2 + ax + b} = \sqrt{x^2}$$

چون تابع خطی است

$$= \sqrt{(x-2)^2} = \sqrt{x^2 - 4x + 4} \Rightarrow a = -4 \checkmark, b = 4 \checkmark$$

$$x = -4 \rightarrow y = x - 2 = -6$$

$$x = 12 \rightarrow y = x - 2 = 10$$

$$Ry = [-6, 10]$$

