

الف) $f(x) = 2 \sin^2(x + \frac{\pi}{3}) - 1$

$\begin{cases} \rightarrow 0 : (-1) : 2x_0 - 1 = -1 \\ \rightarrow 1 : 2x_1 - 1 = 1 \end{cases}$

$R_f \in [-1, 1]$

①

ب) $g(x) = 3 \cos^2 x - 8$

$\begin{cases} \rightarrow -1 : (-7) \\ \rightarrow 1 : 3x_1 - 8 = (-1) \end{cases}$

$R_g \in [-7, -1]$

$y = \frac{x}{|x|} + [x] \quad \text{در بازه} \quad [-3, 3]$

②

$[-3, -2) \Rightarrow \frac{-1}{|-3|} + -2 = -\frac{7}{3}$

$[-2, -1) \Rightarrow -1 + -2 = -3$

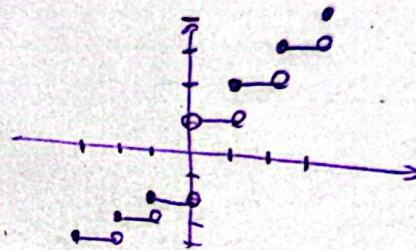
$[-1, 0) \Rightarrow -1 + -1 = -2$

$[0, 1) \Rightarrow 0 \text{ (در صفر)} \\ 1 + 0 = 1$

$[1, 2) \Rightarrow 1 + 1 = 2$

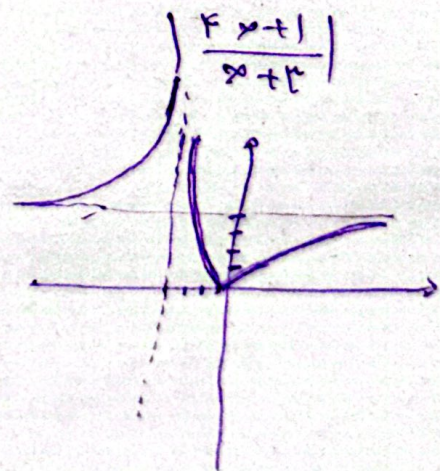
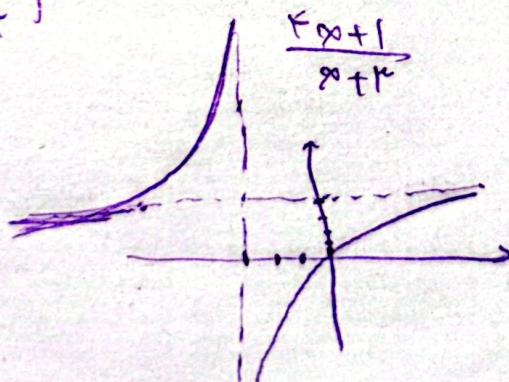
$[2, 3) \Rightarrow 1 + 2 = 3$

$3 \Rightarrow 1 + 3 = 4$



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

③

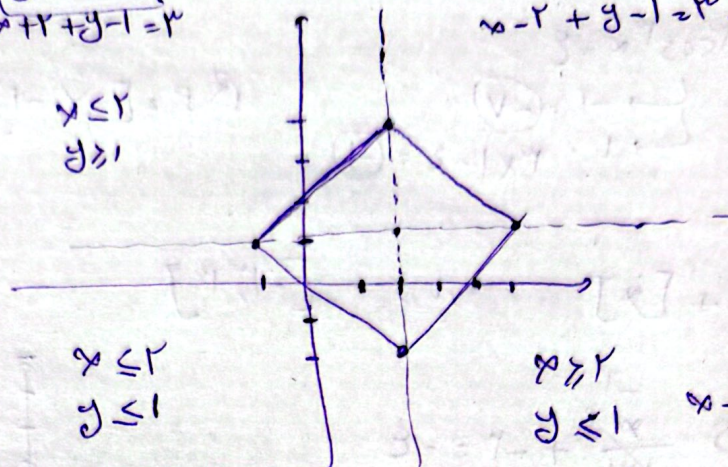


$$|x-2| + |y-1| = 3$$

(F)

$$\begin{aligned} &= y \geq 2+1 \\ &-x+2+y-1=3 \end{aligned}$$

$$\begin{aligned} &x \geq 2 \quad y \geq 1 \\ &x-2+y-1=3 \Rightarrow y = -x+6 \end{aligned}$$



$$\begin{aligned} &x \leq 2 \\ &y \leq 1 \\ &-x+2-y+1=3 \Rightarrow y = -x-1 \end{aligned}$$

$$\begin{aligned} &x \geq 2 \\ &y \leq 1 \\ &x-2-y+1=3 \Rightarrow y = x-4 \end{aligned}$$

$$\text{الف) } f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}} + 1 - 1 = \left(\sqrt{x + \frac{1}{x}} + 1\right)^2 - 1$$

$$\text{Df } x + \frac{1}{x} \geq 0 \Rightarrow \frac{x^2 + 1}{x} \geq 0 \Rightarrow x > 0$$

$$\begin{aligned} &\sqrt{x + \frac{1}{x}} \Rightarrow (\sqrt{x} + \frac{1}{\sqrt{x}})^2 = x + 1 + \frac{2}{x} \\ &= x + 2\sqrt{x} \end{aligned}$$

$$\begin{aligned} \text{ب) } y(1 - \sin x)(1 + \sin x) &= 3 + 3\sin x - \sin x - \sin^2 x \\ &= -\sin^2 x + 3\sin x + 3 \end{aligned}$$

$$\text{Rf } [2 + 2\sqrt{2}, +\infty)$$

$$\begin{aligned} &\leftarrow -1: -1 - 2 + 3 = 0 \\ &\leftarrow 1: -1 + 2 + 3 = 4 \\ &\leftarrow \frac{-b}{2a} = \frac{-3}{-2} = 1.5 \end{aligned}$$

$$\text{Rf } [0, 4]$$

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

(G)

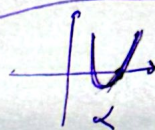
$$\text{Rf } \left\{ \frac{19}{x}, \frac{17}{x}, \frac{15}{x}, \dots, \frac{1}{x} \right\}$$

Df: مجموع اعداد
ظاهری می باشد

$$\frac{19}{x} + \frac{17}{x} + \frac{15}{x} + \dots + \frac{1}{x} = \frac{19 + 17 + 15 + \dots + 1}{x} = \frac{9 \times 50}{x} = \frac{450}{x}$$

المجال (domain)

$$Df: [r, +\infty)$$



$$ax^r + bx + c \geq 0$$

✓

$$a=0$$

$$f(r) = 0$$

$$\Rightarrow rb + c = 0$$

$$f(r) = 1 \Rightarrow rb + c = 1 \Rightarrow b = 1$$

$$c = -r$$

$$f(r): 1$$

$$g(x) = \sqrt{bx^r + ax - rc} = \sqrt{x^r + 0 + \varepsilon}$$

$$\Rightarrow Rg$$

$$Rg: [r, +\infty)$$

$$Rf: [r, +\infty)$$

$$Df: \mathbb{R} - \{a, b\}$$

$$Rf: [c, +\infty) - \{1\}$$

$$f(x) = \frac{x^r - \varepsilon x}{x + r} = \frac{x(x+r)(x-r)}{x+r}$$

$$= x^r - rx$$

$$f\left(\frac{a+b}{rc}\right): f\left(\frac{r-r}{-r}\right) = f(-1)$$

$$x^r - rx = 1 \Rightarrow x^r - rx - 1 = 0$$

$$(x - \varepsilon)(x + r) = 0$$

$$x = \varepsilon, -r$$

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

$$x^r - rx \Rightarrow x_{min} = \frac{-b}{ra} = \frac{r}{r} = 1$$

$$y_{min} = 1 - r = -1 = c$$

$$f(-1) = \frac{(-1)^r - \varepsilon(-1)}{-1+r} = \frac{-1+\varepsilon}{1} = r$$

$$Df: [a, b] = [-r, r] y = \sqrt{x^r + ax^r + bx - 1}$$

9

$$y = x - r$$

$$(ax + b)^r = \alpha x^r + \beta + \frac{r(\alpha x)^r \beta}{r \alpha x^r \beta} + r \alpha x \beta^r$$

$$x^r + ax^r + bx - 1$$

$$\alpha = 1$$

$$\beta^r = -1 \Rightarrow \beta = -r$$

$$[-1, 1]$$

$$r \alpha^r \beta^r = a x^r$$

$$-r \Rightarrow -1$$

$$1r \Rightarrow 1$$

$$\Rightarrow Rf = [-r, \sqrt{1}]$$

$$r \alpha^r x - r = -r = a$$

$$r \alpha \beta^r = r \alpha \beta^r = 1r = b$$

سبنا مقادیر است

10

$$[\infty] + [\infty + \frac{1}{F}]$$

$$[\frac{1}{F}, \infty)$$

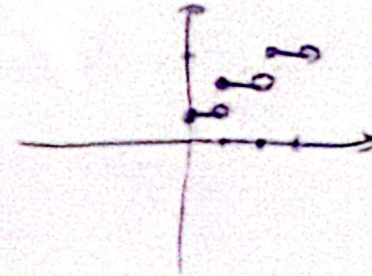
$$[\frac{1}{F}, \infty) : 0 + 1 = 1$$

$$[\frac{1}{F}, \infty)$$

$$[1, \frac{F}{F}) : 1 + 1 = 2$$

$$[\frac{F}{F}, \infty)$$

$$[\frac{F}{F}, \infty) : 1 + 2 = 3$$



10, 1, 2, 3