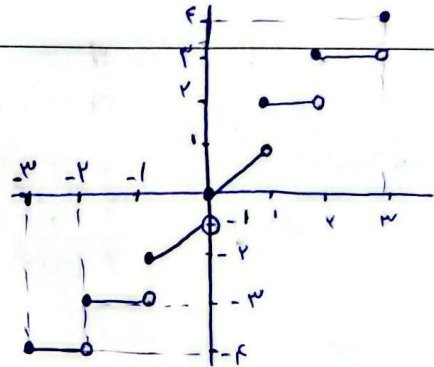


الف) $f(m) = 2 \sin^2(m + \frac{\pi}{3}) - 1 \Rightarrow R_f: 0 \leq \sin^2 m \leq 1 \xrightarrow{+2} 0 \leq 2 \sin^2 m \leq 2 \xrightarrow{-1} -1 \leq 2 \sin^2 m - 1 \leq 1 \Rightarrow R_f = [-1, 1]$

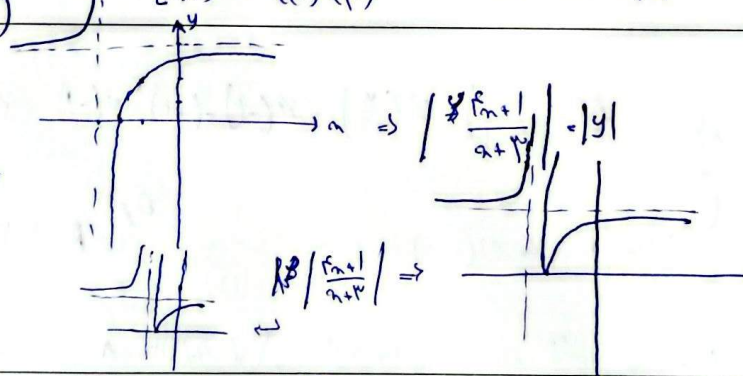
ب) $g(m) = 3 \cos^3 m - 4 \Rightarrow R_g: -1 \leq \cos^3 m \leq 1 \xrightarrow{\times 3} -3 \leq 3 \cos^3 m \leq 3 \xrightarrow{-4} -7 \leq 3 \cos^3 m - 4 \leq -1 \Rightarrow R_g = [-7, -1]$

$y = \frac{a}{|n|} + [-\pi]$

$[-\pi, \pi] \rightarrow [-\pi, -\pi] \rightarrow \frac{\pi}{|n|} - \pi - \pi \rightarrow \frac{1}{\pi} - \pi - \pi \rightarrow \frac{1}{\pi} - 2\pi - \pi$
 $[-\pi, -\pi] \rightarrow \left(\frac{-\pi}{-\pi}\right) \left(\frac{-\pi}{-\pi}\right)$
 $[-\pi, 0] \rightarrow \left(\frac{-\pi}{-\pi}\right) \left(\frac{-\pi}{-\pi}\right)$
 $[0, \pi] \rightarrow \left(\frac{0}{\pi}\right) \left(\frac{\pi}{\pi}\right)$
 $[\pi, \pi] \rightarrow \left(\frac{\pi}{\pi}\right) \left(\frac{\pi}{\pi}\right)$



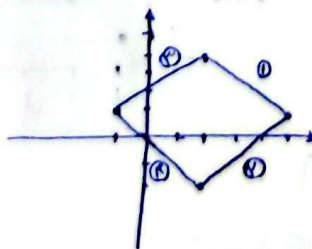
$y = \frac{f(n+1)}{n+3} \rightarrow$ مطابق با $\frac{1}{n+3}$ است
 عدد فرد



ج) $f(m) = \left(m + \frac{1}{m}\right) + \sqrt{m + \frac{1}{m}} \Rightarrow f_{\min} = 2 + 2\sqrt{2} \Rightarrow R_f = [2 + 2\sqrt{2}, +\infty)$
 چون زیر رادیکال
 سه بار مثبت باشد
 $\Rightarrow m + \frac{1}{m} \in [2, +\infty)$

د) $y = (2 \sin m)(1 + \sin m) = -\sin^2 m + 2 \sin m + 2$
 $\begin{cases} \sin m = 1 \rightarrow -(1)^2 + 2(1) + 2 = -1 + 2 + 2 = 3 \\ \sin m = -1 \rightarrow -(-1)^2 + 2(-1) + 2 = -1 - 2 + 2 = -1 \end{cases} \Rightarrow R_f = [-1, 3]$
 $\sin m = \frac{b}{\sqrt{a}} = \frac{-2}{\sqrt{1}} = \frac{-2}{-1} = 2 \Rightarrow$

$|n-2| + |y-1| = 3 \Rightarrow |n-2| \rightarrow n-2, n \geq 2$
 $2-n, n < 2$



$|y-1| \rightarrow y-1, y \geq 1$
 $1-y, y < 1$

سؤال ۴
 (۵, ۱) (۲, ۴) ① $n-2, y \geq 1$
 (۵, ۱) (۲, ۲) ② $n-2, y < 1$
 (۲, ۴) (-۱, ۱) ③ $n-2, y \geq 1$
 (۲, ۲) (-۱, -۱) ④ $n-2, y < 1$

$$f(x) = -\frac{1}{x}x + 10$$

$$D_f = \{1, 2, 3, \dots, 9\} \Rightarrow x=9 \quad \text{نہی} \quad -\frac{1}{x}x + 10 + -\frac{1}{x}x + 10 = -\frac{1}{x}(1+2) + 2 \times 10$$

$$\text{مجموع اعداد} \Rightarrow -\frac{1}{x} \underbrace{(1+2+\dots+9)}_{9 \times 10 = 45} + 9(10) = -\frac{45}{x} + 90 = -15 + 90 = 75$$

$$f(x) = \sqrt{ax^2 + bx + c} \quad D_f = [x_0, +\infty) \quad f(3) = 1 \quad \text{1- باقیمانده در این بین عبارت زیر را در این حد ضیق بارش 2 می باشد}$$

$$\begin{aligned} a < 0 &\Rightarrow b \neq 0 \rightarrow 9b + c = 0 \\ 9b + c &= 1 \Rightarrow b = 1 \Rightarrow f(x) = \sqrt{x-2} \\ c &= -2 \end{aligned}$$

$$g(x) = \sqrt{(1-x)^2 + (x-2)^2} \quad \begin{aligned} &\hookrightarrow g(x) = \sqrt{x^2 + 1} \Rightarrow R_g = \sqrt{[x_0, +\infty)} = [2, +\infty) \\ &\frac{x^2 + 1}{x} = R \cdot [x_0, +\infty) \end{aligned}$$

$$f(x) = \frac{x^2 - x}{x+2} = \frac{x(x-1)}{x+2} = \frac{x(x+2)(x-1)}{(x+2)} = x(x-1) \xrightarrow{\text{تجزیه}} x^2 - x = (x-1)^2 - 1 \Rightarrow \text{کمترین مقدار 1-} \Rightarrow c = -1$$

$$\begin{aligned} R_f &= [c, +\infty) = \{1\} \\ f\left(\frac{-2+3}{2(-1)}\right) &= f\left(\frac{1}{-2}\right) = f(-1) = (-1)^2 - 2(-1) = 3 \\ x^2 - x &= 1 \Rightarrow (x-1)(x+2) = 0 \Rightarrow x_1 = 1, x_2 = -2 \end{aligned}$$

$$y = \sqrt{x^3 + ax^2 + bx - 1} \xrightarrow{\text{حذف}} \sqrt{(x-2)^3} = \sqrt{x^3 - 6x^2 + 12x - 1} \Rightarrow a = -6, b = 12$$

$$\begin{aligned} D_f &= [a, b] = [-4, 12] \\ y &= x-2 \\ R_f &\Rightarrow x_1 = -4 \Rightarrow -4-2 = -6 \\ x_2 &= 12 \Rightarrow 12-2 = 10 \\ R_f &= [-6, 10] \end{aligned}$$

$$y: [n] + [n + \frac{1}{x}] \rightarrow \textcircled{1} [\frac{1}{x}, 1] \Rightarrow [n] = 0, [n + \frac{1}{x}] = 1 \Rightarrow 0+1=1$$

$$x: [\frac{1}{x}, 2]$$

$$\textcircled{2} [\frac{1}{2}, \frac{3}{2}] \Rightarrow [n] = 1, [n + \frac{1}{x}] = 1 \Rightarrow 1+1=2$$

$$\textcircled{3} [\frac{2}{3}, 2] \Rightarrow [n] = 1, [n + \frac{1}{x}] = 2 \Rightarrow 1+1=2$$

(سپارو خط)

