

الف) $r \sin^2\left(n + \frac{\pi}{r}\right) \cdot 1$
 $[0 > 1]$

$0 \leq r \sin^2\left(n + \frac{\pi}{r}\right) \leq r \rightarrow -1 \leq r \sin^2\left(n + \frac{\pi}{r}\right) \cdot 1 \leq 1$

$R_f = [-1, 1]$

ب) $g(n) = 3 \cos^3 n - 4$

$-1 \leq \cos^3 n \leq 1 \rightarrow -3 \leq 3 \cos^3 n \leq 3$

$-7 \leq 3 \cos^3 n - 4 \leq -1$

$R_g = [-7, -1]$

$y = \frac{n}{|n|} + [n] \rightarrow D = \mathbb{R} \setminus \{0\}$

$-3 \leq n < -2 \rightarrow \frac{n}{|n|} + (-3) = -4$

$-2 \leq n < -1 \rightarrow \frac{n}{|n|} + (-2) = -3$

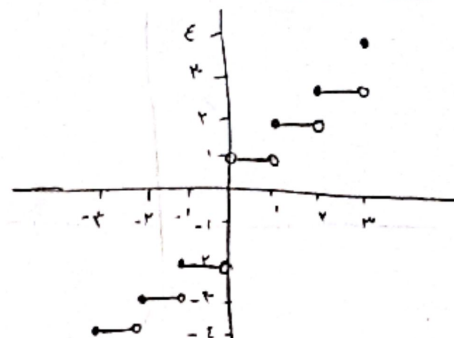
$-1 \leq n < 0 \rightarrow \frac{n}{|n|} + (-1) = -2$

$0 \leq n < 1 \rightarrow \frac{n}{|n|} + (0) = 1$

$1 \leq n < 2 \rightarrow \frac{n}{|n|} + 1 = 2$

$2 \leq n < 3 \rightarrow \frac{n}{|n|} + 2 = 3$

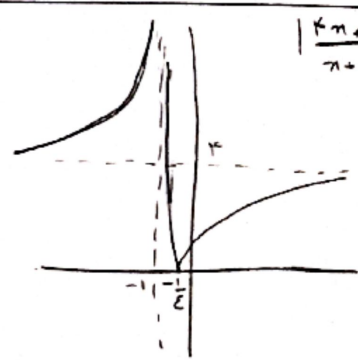
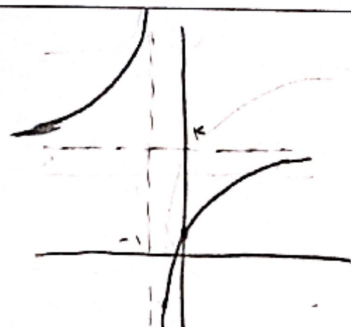
$n \geq 3 \rightarrow \frac{n}{|n|} + 3 = 4$



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

$\frac{\varepsilon n + 1}{n + 3} \xrightarrow{n \rightarrow \infty} \varepsilon$
 عمودی = -1
 افقی = ε

$n \rightarrow 0 \rightarrow y = \frac{1}{3}$



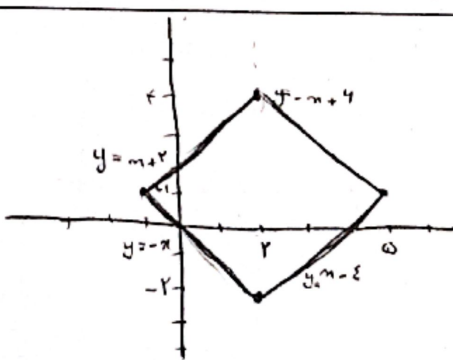
$|x - 2| + |y - 1| = 3$

$x \geq 2, y \geq 1 \rightarrow x - 2 + y - 1 = 3 \rightarrow y = -x + 6$

$x \geq 2, y < 1 \rightarrow x - 2 - y + 1 = 3 \rightarrow y = x - 4$

$x < 2, y \geq 1 \rightarrow -x + 2 + y - 1 = 3 \rightarrow y = x + 2$

$x < 2, y < 1 \rightarrow -x + 2 - y + 1 = 3 \rightarrow y = -x$



الف) $g(n) = n + \frac{1}{n} + 2\sqrt{n + \frac{1}{n}}$

$\left(\sqrt{n + \frac{1}{n}}\right)^2 + 2\sqrt{n + \frac{1}{n}}$

$\max \sqrt{n + \frac{1}{n}} \xrightarrow{n \rightarrow \infty} \infty + \infty = \infty$

$\min \sqrt{n + \frac{1}{n}} \xrightarrow{n \rightarrow 0} \sqrt{2} + 2\sqrt{2} = 3\sqrt{2}$

$-\frac{b}{r_a} = -\frac{2}{\sqrt{2}} = -\sqrt{2}$

$R_f = [3\sqrt{2}, +\infty)$

ب) $g = (3 - \sin n)(1 + \sin n)$

$y = -\sin^2 n + 2\sin n + 3$

$\max \xrightarrow{\sin n = 1} -1 + 2 + 3 = 4$

$\min \xrightarrow{\sin n = -1} -1 - 2 + 3 = 0$

$-\frac{b}{r_a} = -\frac{2}{-1} = 2 \rightarrow -1 + 2 + 3 = 4$

$R_f = [0, 4]$

$$f(n) = -\frac{1}{n}n + 1 \rightarrow D = \{1, 2, \dots, 9\}$$

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

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

$$f(9) = -\frac{1}{9} + \frac{1}{9} = \frac{1}{9}$$

$$Rf = \left\{ \frac{1}{9}, \frac{1}{8}, \dots, \frac{1}{2}, \frac{1}{1} \right\}$$

$$S = \frac{n}{r} (ra_1 + (n-1)d) = \frac{9}{1} \left(\frac{1}{9} + \frac{1}{9} \right)$$

$$a_1 = \frac{1}{9}, d = \frac{1}{9} \Rightarrow \frac{9}{1} \times \frac{1}{9} = \frac{1}{1} \quad (\text{VA})$$

$$f(n) = \sqrt{an^2 + bn + c} \rightarrow Df = [r, +\infty)$$

$$f(x) = 1$$

$$a > 0$$

$$f(x) > 0 \rightarrow \sqrt{2b+c} = 0 \rightarrow 2b+c=0$$

$$f(x) > 1 \rightarrow \sqrt{3b+c} = 1 \rightarrow 3b+c=1$$

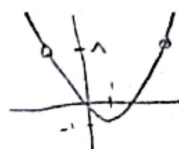
$$b=1, c=-2$$

$$g(n) = \sqrt{bn^2 + an + c} = \sqrt{n^2 + 2}$$

$$y = n^2 + 2 \rightarrow \begin{cases} -\frac{b}{2a} = 0 \\ y \end{cases} \rightarrow [2, +\infty)$$

$$Rg = R\sqrt{n^2 + 2} = [2, +\infty)$$

$$f(n) = \frac{n^2 - 2n}{n+2} = \frac{n(n-2)}{n+2} = \frac{n(n+1)(n-2)}{(n+2)} = n^2 - 2n \rightarrow$$



$$n^2 - 2n = 1 \rightarrow n^2 - 2n - 1 = 0 \rightarrow (n-2)(n+2) = 0 \rightarrow n = 2, -2$$

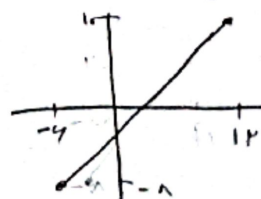
$$Rf = [-1, +\infty) - \{1\} \rightarrow C = -1$$

$$f\left(\frac{a+b}{rc}\right) = f\left(\frac{1}{-1}\right) = f(-1) = (-1)^2 - 2(-1) = 3$$

$$y = \sqrt{n^3 + an^2 + bn - 1} \rightarrow n^3 + an^2 + bn - 1 = (n+2)^3$$

$$(n+2)^3 = n^3 + 6n^2 + 12n - 1 \rightarrow a = 6, b = 12$$

$$Df = [-4, 12] \rightarrow f(n) = n-2$$



$$Rf = [-1, 10]$$

$$y = [n] + \left[n + \frac{1}{r}\right]$$

$$\left[\frac{1}{r}, 1\right) \xrightarrow{[n]=0} 1$$

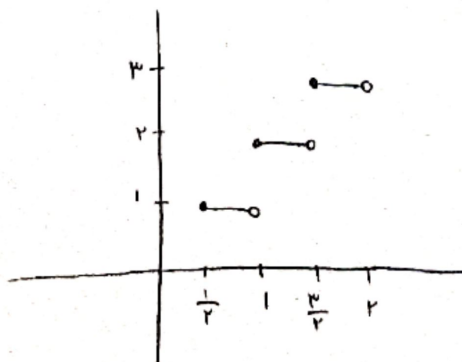
$$\left[n + \frac{1}{r}\right] = 1$$

$$\left[1, \frac{2}{r}\right) \xrightarrow{[n]=1} 2$$

$$\left[n + \frac{1}{r}\right] = 1$$

$$\left[\frac{2}{r}, 2\right) \xrightarrow{[n]=1} 3$$

$$\left[n + \frac{1}{r}\right] = 2$$



از ۳ باره خط شیب دارد