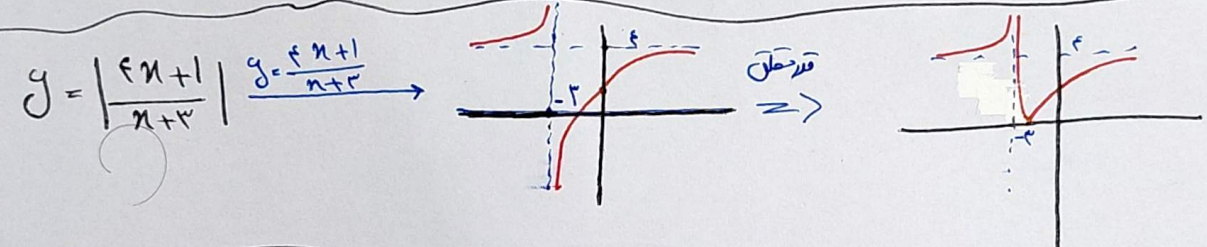
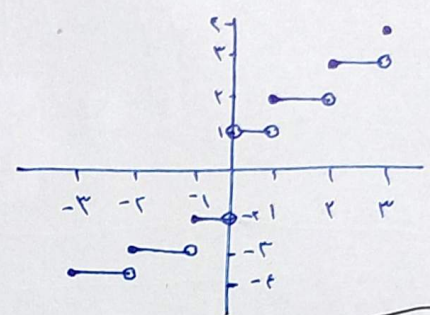


الف) $f(n) = 2 \sin^2(n + \frac{\pi}{2}) - 1 \xrightarrow{aD^2 + bD + c} \begin{matrix} \text{max} & 2-1=1 \\ & -2 \\ \text{min} & -1-1=-2 \\ & 0-1=-1 \end{matrix} \Rightarrow R_f = [-2, 1]$

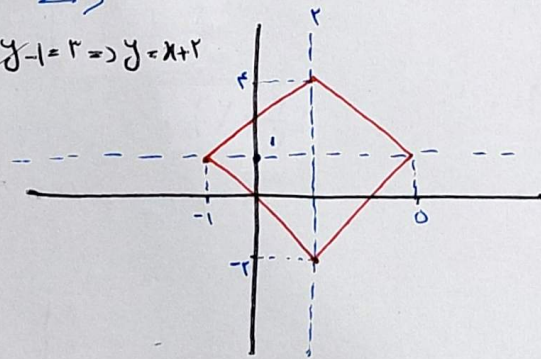
ب) $g(n) = 3 \cos^2 n - 5 \rightarrow -1 \leq \cos n \leq 1 \Rightarrow -1 \leq \cos^2 n \leq 1 \Rightarrow -3 \leq 3 \cos^2 n \leq 3$
 $\Rightarrow -8 \leq 3 \cos^2 n - 5 \leq -2$

$y = \frac{x}{|n|} + [n]$

$[-3, 2)$	$\Rightarrow -1 + (-3) = -4$
$[-2, -1)$	$\Rightarrow -1 + (-2) = -3$
$[-1, 0)$	$\Rightarrow -1 + (-1) = -2$
$[0, 1)$	$\Rightarrow -1 + 0 = -1$
$[1, 2)$	$\Rightarrow -1 + 1 = 0$
$[2, 3)$	$\Rightarrow -1 + 2 = 1$
$[3, 4)$	$\Rightarrow -1 + 3 = 2$
$[4, 5)$	$\Rightarrow -1 + 4 = 3$
$[5, 6)$	$\Rightarrow -1 + 5 = 4$



$|n-2| + |y-1| = 3 \Rightarrow$
 $2-n+y-1=3 \Rightarrow y = n+2$
 $x-2+y-1=3 \Rightarrow y = -n+6$



$2-n+1-y=3$
 $\Rightarrow y = -n$

$n-2-y+1=3$
 $\Rightarrow y = n-4$

د) $f(n) = n + \frac{1}{n} + \sqrt{n + \frac{1}{n}}$
 $\begin{matrix} a + \frac{1}{a} \downarrow \\ (-\infty, -1] \cup (1, +\infty) \end{matrix}$
 $(-1, +\infty) \quad [1, +\infty)$
 $\begin{matrix} \text{max} & -1+1+3=3 & R_f = [0, 3] \\ & -1-1+2=0 \\ & 1-1+2=2 \\ & 1+1+2=4 \end{matrix}$
 $\Rightarrow R_f = (-\infty, -2] \cup [2, +\infty) + [1+\sqrt{2}, +\infty)$
 $\Rightarrow R_f = (-\infty, -2+\sqrt{2}] \cup [1+\sqrt{2}, +\infty)$

$f(n) = -\frac{1}{n} + 1 \xrightarrow{D_f = \{1, 2, \dots, 9\}}$
 $\begin{cases} * 9 \times 1. \\ * (-\frac{1}{1} + -\frac{1}{2} + \dots + -\frac{1}{9}) = -\frac{1}{1} \times \frac{9}{1} = -10 \end{cases}$
 $\Rightarrow \text{جمع برک} : 9 \cdot -10 = -90$

$$f(x) = \sqrt{ax^2 + bx + c} \quad R = [r, +\infty) \rightarrow a = 0 \Rightarrow 2b + c = 0 \Rightarrow b = 1, c = -2$$

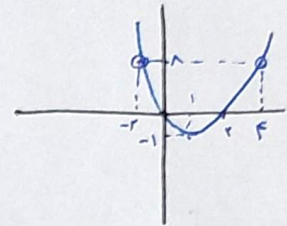
$$f(x) = 1 \rightarrow 2b + c = 1$$

$$\Rightarrow g(x) = \sqrt{bx^2 + ax - c} = \sqrt{x^2 + 1} \Rightarrow R_f = [1, +\infty)$$

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

$$\Rightarrow D_f = R - \{-1\} \Rightarrow R_f = [-1, +\infty) - \{1\}$$

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



$$g = \sqrt[3]{x^3 + ax^2 + bx - 1} \xrightarrow{\text{divide } x} \sqrt[3]{(x-1)^3} = \sqrt[3]{x^3 - 3x^2 + 3x - 1}$$

$$\Rightarrow D_g = [-1, 1] \Rightarrow f(-1) = -1, f(1) = 1 \Rightarrow R_g = [-1, 1]$$

$$g = \left[x \right] + \left[x + \frac{1}{x} \right] \begin{cases} \left[\frac{1}{x}, 1 \right) \\ \left[1, \frac{x}{2} \right) = 2 \\ \left[\frac{x}{2}, x \right) = 3 \end{cases}$$

