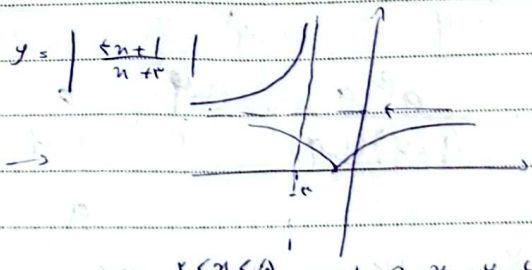
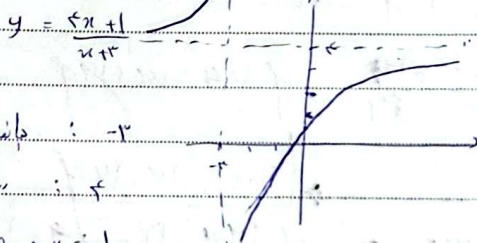
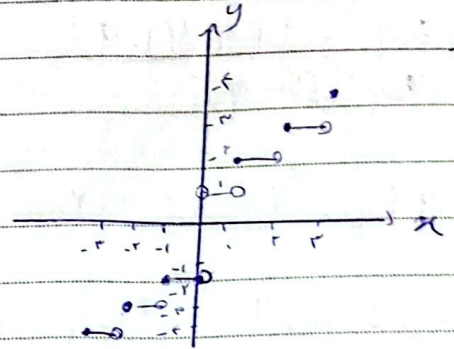


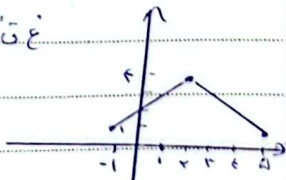
ا) $\sin(x + \frac{\pi}{2}) \rightarrow \begin{cases} 1 \rightarrow f(x) = 1 \\ -1 \rightarrow f(x) = -1 \end{cases} \quad R = [-1, 1]$

ب) $\cos(x) \rightarrow \begin{cases} 1 \rightarrow g(x) = 1 \\ -1 \rightarrow g(x) = -1 \end{cases} \quad R = [-1, 1]$

$x < -2 \rightarrow [x] = -3 \rightarrow y = -1 - 3 = -4$
 $-2 < x < -1 \rightarrow [x] = -2 \rightarrow y = -1 - 2 = -3$
 $-1 < x < 0 \rightarrow [x] = -1 \rightarrow y = -1 - 1 = -2$
 $0 < x < 1 \rightarrow [x] = 0 \rightarrow y = 1$
 $1 < x < 2 \rightarrow [x] = 1 \rightarrow y = 1 + 1 = 2$
 $2 < x < 3 \rightarrow [x] = 2 \rightarrow y = 1 + 2 = 3$
 $x = 3 \rightarrow [x] = 3 \rightarrow y = 1 + 3 = 4$

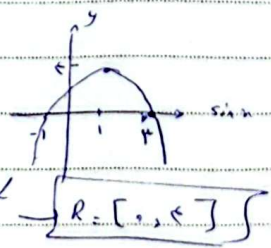


$|y-1| = 3 - |x-2| \rightarrow \begin{cases} x > 2 \rightarrow |y-1| = 3 - (x-2) = 5-x \\ x < 2 \rightarrow |y-1| = 3 + (x-2) = x+1 \end{cases}$



ا) $x + \frac{1}{x} \geq 2 \rightarrow R = [2 + 2\sqrt{2}, +\infty)$

ب) $y = 3 + \frac{\sin x - \sin^2 x - \sin^3 x}{\sin x} \quad \text{exc } \begin{cases} -\frac{b}{a} = 1 \\ y = 3 + 1 - 1 = 3 \end{cases}$



$f(x) = -\frac{1}{x} (1 + 2 + \dots + 9) + 9(1) = -\frac{1}{x} (\frac{9 \times 10}{2}) + 9 = -45 + 9 = -36$

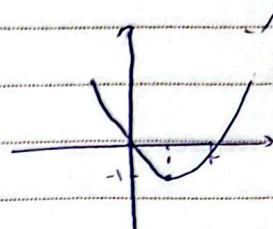
$a=0 \rightarrow f(x) = \sqrt{bx+c} \quad b \neq 0 \rightarrow x = \frac{f(x)^2 - c}{b} \rightarrow f(x) = \sqrt{\frac{f(x)^2 - c}{b}}$ ✓

$c = -r \quad f(x) = 1$ ✓

$g(x) = \sqrt{x^2 - r(-r)} = \sqrt{x^2 + r^2} \rightarrow g(x) = r \rightarrow R = [r, +\infty)$

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

ent $\begin{vmatrix} 1 \\ -1 \end{vmatrix}$



$x \neq -r$

$x^2 - rx \neq 1 \rightarrow x^2 - rx - 1 \neq 0 \rightarrow (x-r)(x+r) \neq 0 \rightarrow x \neq r, -r$

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

$D = R - \{x \in \mathbb{R} : x = -r\}$
b>a

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

$y = \sqrt[3]{(x-r)^3} = \sqrt[3]{x^3 - 1 + 3x(x-r)(x-r)} = \sqrt[3]{x^3 - 1 - 4x^2r + 12xr}$

$a = -4 \quad b = 12 \rightarrow D = [-4, 12]$

$y = x + \begin{matrix} x \rightarrow -4 \\ x \rightarrow 12 \end{matrix} \begin{matrix} y = -1 \\ y = 1 \end{matrix} \rightarrow R = [-1, 1]$

$\frac{1}{r} \leq x \leq 1 \rightarrow [x] = 0 \quad [x + \frac{1}{r}] = 1 \rightarrow y = 1$

$1 \leq x \leq \frac{r}{r} \rightarrow [x] = 1 \quad [x + \frac{1}{r}] = 1 \rightarrow y = r$

$\frac{r}{r} \leq x \leq r \rightarrow [x] = 1 \quad [x + \frac{1}{r}] = 2 \rightarrow y = r^2$

