

الف) $f(x) = 15 \sin^2(x + \frac{\pi}{10}) - 1$

$\sin x \xrightarrow{1} 1 \rightarrow 1$
 $\xrightarrow{0} 0 \rightarrow 0$ $R = [-1, 1]$

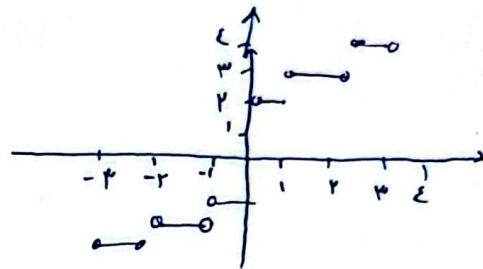
ب) $g(x) = 3 \cos^3 x - 2$

$\cos x \xrightarrow{1} 1 \rightarrow 1$
 $\xrightarrow{-1} -1 \rightarrow -1$ $R = [-7, 1]$

1

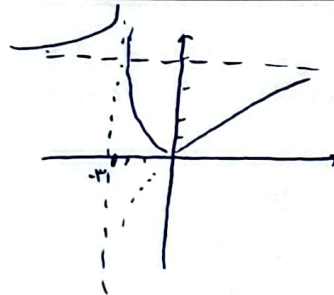
$y = \frac{x}{|x|} + [x]$

$-3 \leq x < 0 \rightarrow -1 + [x]$ $0 \leq x < 3 \rightarrow 1 + [x]$



2

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



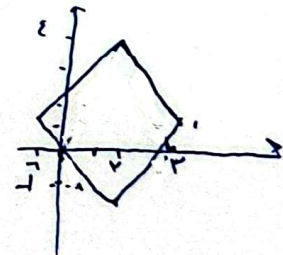
3

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

$2 - (x-2) \geq 0 \rightarrow -1 \leq x \leq 5$

$y \geq 1 \rightarrow y-1 = 2 - (x-2) \rightarrow y = 4 - (x-2)$ $\begin{cases} -1 \leq x \leq 2 \rightarrow y = x+2 \\ 2 \leq x \leq 5 \rightarrow y = -x+4 \end{cases}$

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



4

الف) $f(x) = x + \frac{1}{x} + 2\sqrt{x + \frac{1}{x}}$ $\rightarrow t + 2\sqrt{t}$
 $x = -\frac{1}{x}$

$R = (1 + 2\sqrt{2}, +\infty)$

5

ب) $f(x) = (1 - \sin x)(1 + \sin x) \rightarrow \sin x = 1 \rightarrow x = \frac{\pi}{2}$
 $\sin x = -1 \rightarrow x = \frac{3\pi}{2} \rightarrow R = [0, \frac{\pi}{2}]$

$$1 \rightarrow \frac{1}{\mu} \quad 1 \rightarrow \frac{1}{\mu} \quad 1 \rightarrow 1 \quad \varepsilon \rightarrow \frac{1}{\mu} \quad d \rightarrow \frac{1}{\mu} \quad 1 \rightarrow 1 \quad 1 \rightarrow \frac{1}{\mu} \quad 1 \rightarrow \frac{1}{\mu} \quad 1 \rightarrow 1$$

$$\frac{1 + 1 + 1 + 1 + 1 + 1}{\mu} + 1 + 1 + 1 = 1$$

Swk
 $[+1, +1]$ is a basis
 Swk $a = -1$

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

$$\begin{cases} 1b + c = 1 \\ 1b + c = 1 \end{cases} \rightarrow \begin{cases} b = 1 \\ c = -1 \end{cases}$$

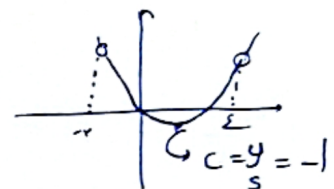
$$g(n) = \sqrt{2n^2 + \varepsilon} \rightarrow D = n$$

$$R = [1, +\infty)$$

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

$$\frac{n^2 - \varepsilon n}{n + 1} = 1 \rightarrow n^2 - \varepsilon n = n + 1 \rightarrow \omega(n) = \frac{-1 \pm \varepsilon}{2 \pm b}$$

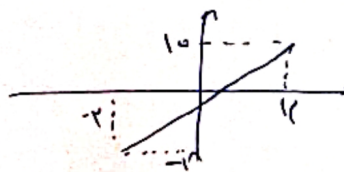
$$f\left(\frac{a+b}{2}\right) = f\left(\frac{-1+\varepsilon}{2}\right) = 1$$



$$\sqrt[n]{(n - \varepsilon)^n} = \sqrt[n]{\frac{n^2 - 4n^2 + 16n - n}{a} \cdot \frac{1}{b}} \rightarrow D = [-4, 12]$$

$$f(n) = n - 1 \rightarrow D = [-4, 12]$$

$$R_f = [-1, 1]$$



$$y = (n) + (n + \frac{1}{p})$$

$$\begin{aligned} [1, 1] &\rightarrow y = 1 \\ [1, \frac{1}{p}] &\rightarrow 1 + 1 = 2 \\ [\frac{1}{p}, 1] &\rightarrow 1 + 1 = 2 \end{aligned}$$

