

الف) $2 \sin^2(n + \frac{\pi}{2}) - 1$

$0 \leq \sin^2(n + \frac{\pi}{2}) \leq 1$

$0 \leq 2 \sin^2(n + \frac{\pi}{2}) \leq 2$

$-1 \leq 2 \sin^2(n + \frac{\pi}{2}) - 1 \leq 1$

$-1 \leq y \leq 1 \Rightarrow R = [-1, 1]$

ب) $3 \cos^2 n - 2$

$-1 \leq \cos^2 n \leq 1$

$-3 \leq 3 \cos^2 n \leq 3$

$-5 \leq 3 \cos^2 n - 2 \leq 1$

$-5 \leq y \leq 1$

$R = [-5, 1]$

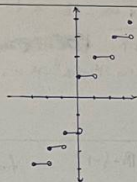
$y = \frac{n}{|n|} + [n]$

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

$[1, 2) \rightarrow 1 + 1 = 2$ $[-2, -1) \rightarrow -1 + (-2) = -3$

$[2, 3) \rightarrow 1 + 2 = 3$ $[-3, -2) \rightarrow -1 + (-3) = -4$

$\{3\} \rightarrow 1 + 3 = 4$



$y = \frac{n+1}{n+3}$

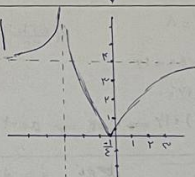
محدوده بالا = ۲

محدوده پایین = -۳

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

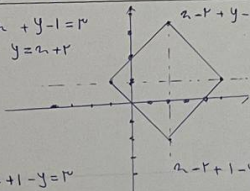
$y \rightarrow 0 \Rightarrow n = -\frac{1}{3}$

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



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

$\Rightarrow y = n + 2$



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

$\Rightarrow y = -n$

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

ج) $(2 \sin n)(1 + \sin n) = (-1)(\sin^2 n - \cos^2 n - 1)$

$= -\sin^2 n + \cos^2 n + 1$

$\min \sin n \xrightarrow{1} y = 0$

$\max \sin n \xrightarrow{1} y = 2$

$\frac{1}{\sqrt{2}} = 1 \rightarrow$

$R = [0, 2]$

د) الف) $f(n) = n + \frac{1}{n} + \sqrt{n + \frac{1}{n}} + 1 - 1 \Rightarrow f(n) = \frac{\sqrt{n + \frac{1}{n}} + 1}{t} - 1$

min: $\min n + \frac{1}{n} \xrightarrow{(2,5)} 2 \Rightarrow \min f = \sqrt{2} + 1$

Max: $\max n + \frac{1}{n} \xrightarrow{(2,5)} +\infty \Rightarrow \max f = +\infty$

$\frac{-b}{2a} : 0 \quad \sqrt{n + \frac{1}{n}} + 1 = 0 \Rightarrow \sqrt{n + \frac{1}{n}} = -1 \quad \text{و نه}$

$\Rightarrow R_f = [\sqrt{2} + 1, +\infty)$

$$D_f = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$$

$$n=1 \rightarrow y=1-\frac{1}{1^2} \quad n=2 \rightarrow y=1-\frac{1}{2^2} \quad n=3 \rightarrow y=1-\frac{1}{3^2}$$

$$n=4 \rightarrow y=1-\frac{1}{4^2} \quad n=5 \rightarrow y=1-\frac{1}{5^2} \quad n=6 \rightarrow y=1-\frac{1}{6^2}$$

$$n=7 \rightarrow y=1-\frac{1}{7^2} \quad n=8 \rightarrow y=1-\frac{1}{8^2} \quad n=9 \rightarrow y=1-\frac{1}{9^2}$$

$$1 \cdot \left(\frac{1}{1^2}\right) + 1 \cdot \left(\frac{1}{2^2}\right) + 1 \cdot \left(\frac{1}{3^2}\right) + 1 \cdot \left(\frac{1}{4^2}\right) + 1 \cdot \left(\frac{1}{5^2}\right) + 1 \cdot \left(\frac{1}{6^2}\right) + 1 \cdot \left(\frac{1}{7^2}\right) + 1 \cdot \left(\frac{1}{8^2}\right) + 1 \cdot \left(\frac{1}{9^2}\right) = 1 + \frac{1}{4} + \frac{1}{9} + \frac{1}{16} + \frac{1}{25} + \frac{1}{36} + \frac{1}{49} + \frac{1}{64} + \frac{1}{81} = 1.61522654$$

$$A: an^2 + bn + c \quad \frac{n}{A} = \frac{1}{1} + \Rightarrow a=0 \sim bn+c=1 \quad n=\frac{-c}{b}=1 \Rightarrow C=-1b$$

$$f(n)=1 \rightarrow \sqrt{bn-1b} = \sqrt{1b-1b} = \sqrt{b}=1 \Rightarrow b=1, c=-1$$

$$g(n) = \sqrt{2n^2+1} \rightarrow 2n^2+1 \in [\varepsilon, +\infty) \quad \sqrt{[\varepsilon, +\infty)} = [\sqrt{\varepsilon}, +\infty)$$

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

$$\frac{n^2 - 1}{n+1} = 1$$

$$n^2 - 1 = n^2 - n + 1$$

$$n^2 - 1 = n^2 - n + 1$$

$$n(n-1) = 1 \Rightarrow n=2 \Rightarrow a=-1, b=1 \Rightarrow a+b=1$$

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

$$\frac{-b}{2a} = \frac{1}{2} = 1$$

$$n=1 \rightarrow y=-1$$

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

$$\Rightarrow PC = -1$$

$$y = \sqrt[n]{A} \xrightarrow{\text{dieci}} A = t^n, t = an+b \Rightarrow y = \sqrt[n]{(an+b)^n} = an+b$$

$$n^2 + an^2 + bn - 1 = t^n = (n-1)^n \Rightarrow n^2 - 2n^2 + 12n - 1 \Rightarrow \begin{cases} a=-1 \\ b=12 \end{cases}$$

$$-1 \leq n \leq 12 \rightarrow -1 \leq n-1 \leq 11 \quad (n-1) \in [-1, 1] \quad R = [-1, 1]$$

$$\left(\frac{1}{2}, 1\right) \rightarrow 0 + 1 = 1$$

$$\left(1, \frac{1}{2}\right) \rightarrow 1 + 1 = 2$$

$$\left(\frac{1}{2}, \frac{1}{2}\right) \rightarrow 1 + 1 = 2$$

