

الف) $\min f_n = -1$ $\max f_n = 1$

راه حل

$R_{f_n} = [-1, 1]$ ✓

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شایان روسی زاده

1 (1,25)

ب) $g_n = 3 \cos^3 n - 4$ $-1 \leq \cos n \leq 1$ $R_{f_n} = [-7, -1]$ ✓

$-3 \leq x < -2 \rightarrow y = -2$

$-2 \leq x < -1 \rightarrow y = -3$

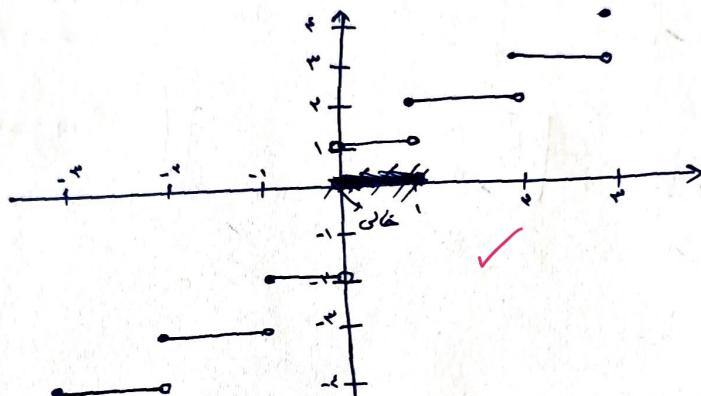
$-1 \leq x < 0 \rightarrow y = -2$

$0 \leq x < 1 \rightarrow y = 1$

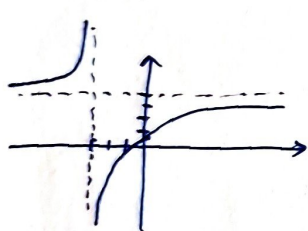
$1 \leq x < 2 \rightarrow y = 2$

$2 \leq x < 3 \rightarrow y = 3$

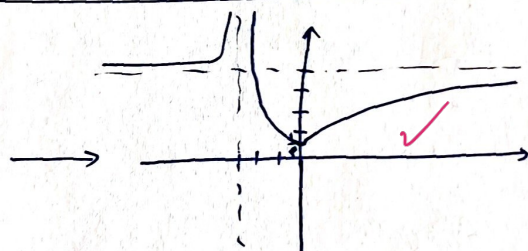
$x = 3 \rightarrow y = 2$



2 (2)



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



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

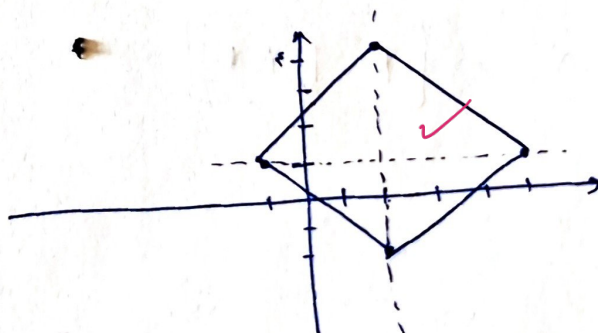
2 (2)

$x > 2, y > 1 \rightarrow x + y = 4 \rightarrow y = -x + 4$

$x > 2, y < 1 \rightarrow x - y = 4 \rightarrow y = x - 4$

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

$x < 2, y < 1 \rightarrow -x - y = 0 \rightarrow y = -x$



2 (2)

$\sqrt{x + \frac{1}{x}} = t$ $f(x) = t^2 + 2t$ $y' = \frac{2t}{2t} = \frac{2}{2} = 1$

$x + \frac{1}{x} \geq 2 \leq x + \frac{1}{x} \leq -2 \rightarrow x + \frac{1}{x} \geq 2 \rightarrow \min f_n = 2 + 2\sqrt{2} \rightarrow R_{f_n} = [2 + 2\sqrt{2}, +\infty)$ ✓

$y = -\sin^4 x + 2 \sin x + 3 = -(\sin x - 1)^2 + 4$

$\min y \Rightarrow \sin x = -1 \rightarrow y = 0$

$\max y \Rightarrow \sin x = 1 \rightarrow y = 4$

$R = [0, 4]$ ✓

2 (2) d

$$D = \{1, 2, 3, \dots, 8, 9\}$$

$$f_1 + f_2 + \dots + f_9 = (9 \times 10) + \left(-\frac{1}{9}\right) \left(\frac{9 \times 10}{9}\right) = \boxed{V \checkmark}$$

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$\rightarrow$ ~~مع کابل~~ $\rightarrow f(x) = \sqrt{ax^2 + bx + c} = x(x-2)^{1/2} \rightarrow f_{(1)} = 1 \rightarrow a=1$ (1, V)
 $\rightarrow f(x) = \sqrt{x^2 - 4x + 4} \rightarrow a=1, b=-4, c=4$ V
 $D = (0, +\infty) \rightarrow a=1$ (غلط) $\rightarrow 2b+c=0 \rightarrow b=1, c=-2$
 $g(x) = \sqrt{-x^2 + x - 1}$
 $y_s = \frac{-a}{f_a} = \frac{-(1+121)}{-14} = \frac{122}{14}$
 $R_{g(x)} = (-\infty, \frac{122}{14}]$
 $g(x) = \sqrt{x^2 + 4} \rightarrow D_f = [2, +\infty)$ کابل بنویس

$$f_x = \frac{x(x+2)(x-2)}{x+2} = x(x-2)$$

$$x(x-2) = 1 \rightarrow x=2 \rightarrow a, b = 2, -2$$

$$f = x^2 - 2x \quad y_s = \frac{-a}{f_a} = \frac{-2}{2} = -1 \rightarrow R = [-1, +\infty) - \{1\} \rightarrow c = -1$$

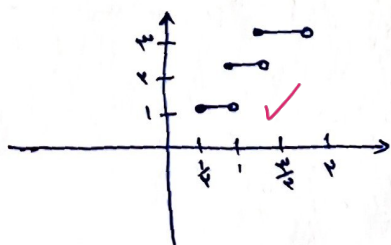
$$f\left(\frac{2-2}{-1}\right) = f(-1) = \boxed{3} \checkmark$$

$$y = \sqrt[3]{(x-2)^3} = \sqrt[3]{x^3 - 6x^2 + 12x - 8} \rightarrow a = -8, b = 12$$

$$D = [-2, 12] \Rightarrow R = [-1, 10]$$

$$\frac{1}{4} \leq x < \frac{5}{4} \rightarrow [x + \frac{1}{4}] = 1 \rightarrow y = [x] + 1 \quad \begin{cases} \frac{1}{4} \leq x < 1 \rightarrow y = 1 \\ 1 \leq x < \frac{5}{4} \rightarrow y = 2 \end{cases}$$

$$\frac{5}{4} \leq x < 2 \rightarrow [x + \frac{1}{4}] = 2 \rightarrow y = [x] + 2 \rightarrow \frac{5}{4} \leq x < 2 \rightarrow y = 3$$



(خط غلط)

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$$\text{الف) } 0 \leq \sin\left(u + \frac{\pi}{2}\right) \leq 1 \rightarrow -1 \leq 2\sin\left(u + \frac{\pi}{2}\right) - 1 \leq 1$$

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

۷- با توجه به دامنه، زیر رادیکال یک خط با شیب مثبت بوده یعنی $a=0$ است و نقطه $(2,0)$ هم در معادله خط صدق میکنند...

$$\begin{cases} (2,0) \rightarrow 2b+c=0 \\ (3,1) \rightarrow 3b+c=1 \end{cases} \rightarrow b=1, c=-2$$

$$g(u) = \sqrt{u^2+4} \rightarrow \text{ext} \Big|_4^0 \Rightarrow R_g = \sqrt{[4, +\infty)} = [2, +\infty)$$