

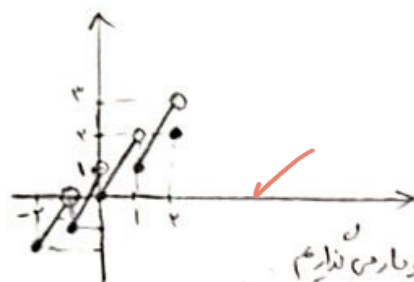
$f(n) = n^2 + 2n + 1 + 9n^2 + 1 - 4n + mn^2 + mn + mn = (1+9+m)n^2 + (2-4+m)n + mn + 1$
 $\Rightarrow (10+m)n^2 + (m-2)n + mn + 1$
 $\Rightarrow f(n) = -28$
 $g(n) = \{(f, -1), (f, p+1), (p+2, -1), (-9, p+k)\} \Rightarrow p+1 = -1 \Rightarrow p = -2$
 $\Rightarrow -1 = p+k \Rightarrow k = 1$
 $\Rightarrow m+n+p+k = -10 + 4 + 1 + (-1) = -6$ جواب

الف) $\frac{n-2}{n^2-3n-4} > 0$ صورت ≤ 2 و مخرج > 0 $\Rightarrow n \leq 2$
 $\Rightarrow n^2 - 2 > 0 \Rightarrow n^2 > 2 \Rightarrow n > \sqrt{2}$
 $\Rightarrow n \in (-\sqrt{2}, 2) \cup (2, \infty)$ جواب
 ب) $f(-n) = 0 \Rightarrow f = f(-n) \Rightarrow [-n] \leq 2 \Rightarrow -3 < -n \leq -2$
 $\Rightarrow D_f \subset \mathbb{R} - (-3, -2]$ جواب

الف) $\frac{n^2-1}{n^2-3n-4} > 0 \Rightarrow \frac{-1}{-4} > 0 \Rightarrow [-1, 0] \cup [1, \infty)$
 $\Rightarrow |n| + n > 0 \Rightarrow |n| > -n \Rightarrow n > 0 \Rightarrow \mathbb{N} \cap \mathbb{Z} \subset [1, \infty)$
 ب) $|n-2| - n^2 > 0 \Rightarrow n^2 \leq |n-2| \Rightarrow \mathbb{N} - 2 > n^2 \Rightarrow n^2 - n + 2 > 0$
 $\Rightarrow n-2 \leq -n^2 \Rightarrow n^2 + n - 2 \leq 0 \Rightarrow (n+2)(n-1) \leq 0 \Rightarrow -2 \leq n \leq 1$
 $\Rightarrow \mathbb{N} \cap \mathbb{Z} \subset [-2, 1]$ جواب

$|n-2| - 1 = k \Rightarrow |n-2| - 1 \leq k \Rightarrow \mathbb{N} - 2 - 1 \leq k \Rightarrow |n-2| \leq k+1$
 $\Rightarrow n-2 \leq k+1 \Rightarrow n \leq k+3$
 $\Rightarrow n-2 \geq -k-1 \Rightarrow n \geq 1-k$
 $\Rightarrow k+3 \geq 1-k \Rightarrow k \geq -1$
 $\Rightarrow k \in \mathbb{Z} \Rightarrow k \geq -1$ جواب
 ب) $|n-2| - 1 = -k \Rightarrow |n-2| \leq 1-k \Rightarrow n-2 \leq 1-k \Rightarrow n \leq 3-k$
 $\Rightarrow n-2 \geq -1-k \Rightarrow n \geq k+1$
 $\Rightarrow 3-k \geq k+1 \Rightarrow k \leq 1$
 $\Rightarrow k \in \mathbb{Z} \Rightarrow k \leq 1$ جواب

$-2 \leq n < -1 \Rightarrow [n] = -2 \Rightarrow y = 2n+2$
 $-1 \leq n < 0 \Rightarrow [n] = -1 \Rightarrow y = 2n+1$
 $0 \leq n < 1 \Rightarrow [n] = 0 \Rightarrow y = 2n$
 $1 \leq n < 2 \Rightarrow [n] = 1 \Rightarrow y = 2n-1$
 $\Rightarrow y = 2[x] - [2] = 2$



$$(n-2)(n-1)$$

$$f(n) = \frac{n^2 - 2n + 3}{n+2} + b \quad \text{و } \begin{cases} a=1 \\ b=1 \end{cases} \rightarrow y=an+b \rightarrow \text{تابع خطی}$$

$$\Rightarrow \textcircled{1} n+2 = n-2 \Rightarrow \boxed{a=-3} \rightarrow \frac{(n-2)(n-1)}{n-2} + b \Rightarrow n-1+b \Rightarrow \boxed{b=1} \rightarrow y=n$$

در حالت اول $a-b = -3-1 = -4 \checkmark$

$$\textcircled{2} n+2 = n-1 \Rightarrow \boxed{a=-1} \Rightarrow \frac{(n-2)(n-1)}{n-1} + b \Rightarrow n-2+b \Rightarrow \boxed{b=2} \rightarrow y=n$$

در حالت دوم $a-b = -1-2 = -3 \checkmark$

و در هر دو $a-b$ برابر -4 یا -3 است.

$$f(n) = \frac{n^2 + 2n^2 - n - 2}{n^2 - 1} = \frac{n^2(n+2) - n - 2}{n^2 - 1} \Rightarrow \frac{(n+2)(n^2-1)}{n^2-1} = n+2 \rightarrow L \text{ و } L$$

$$\Rightarrow n+2 = n+c \Rightarrow \boxed{c=2} \checkmark$$

و $n+2 = n+c \Rightarrow \boxed{c=2} \checkmark$

$f(n) = \frac{an+2}{n+b} : n=1 \Rightarrow \frac{a+2}{1+b} = 3 \rightarrow a+2 = 3(1+b) \Rightarrow a+2 = 3+3b \Rightarrow a-3b=1$

$$n=1 \Rightarrow \frac{-a+2}{b-1} = 1 \Rightarrow -a+2 = b-1 \Rightarrow b+a=3$$

و $b+c = \frac{1}{2} + 2 = \frac{5}{2} \checkmark$

$$D_f = f(x) - 3a > 0 \Rightarrow x > \frac{3}{f} a$$

و $D_g = b - f(x) > 0 \Rightarrow x < \frac{b}{f} \Rightarrow \frac{3}{f} a < x < \frac{b}{f} \xrightarrow{\text{حداقل و حداکثر}} \frac{3}{f} a = \frac{b}{f} = 1$

$\Rightarrow \boxed{a = \frac{f}{3}} \quad \boxed{b = f}$

$$2f - g(1) = 2(\sqrt{f-f+k-1}) - (\sqrt{f-f}) - 2k = k \Rightarrow 2k = \frac{2-f-2k}{-k-2} \Rightarrow 2k = -2$$

$\Rightarrow \boxed{k=-1} \Rightarrow 2(\frac{f}{3}) - \frac{f}{2} + 1 = 3 \checkmark$

$$D_f \cap D_g = [-1, 5] \Rightarrow D_f \cap D_g \quad D_g = 2n+2 > 0 \Rightarrow 2n > -2 \Rightarrow n > -1$$

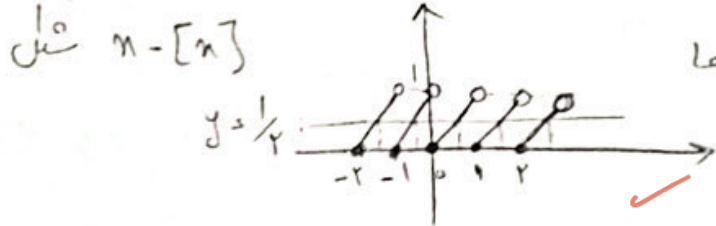
$$f - g(2) = 4\sqrt{2} \Rightarrow f(2) = 4\sqrt{2}$$

و $\frac{\sqrt{2}+2}{2\sqrt{2}}$

$\boxed{m=5} \Rightarrow n \leq m \leq m-n \Rightarrow 0 \leq n \leq 5$

$$f(3) = 4\sqrt{2} \Rightarrow \sqrt{3-2} + n = 4\sqrt{2} \Rightarrow \boxed{n = 4\sqrt{2} - 1} \Rightarrow m+n = 4\sqrt{2} - 1 + 5 = 4\sqrt{2} + 4 \checkmark$$

$$y = (-1)^x (n - [x]) \cdot \frac{1}{2} \Rightarrow n - [x] = \frac{1}{2}$$



اصولاً در بازه $(-2, 2)$ = محل تقاطع ها

$[-2, 2]$ باید باشد پس یکی از آنها

(اولی از راست) محسوب نمی شود زیرا

$x > 2$ است پس $\textcircled{4}$ جواب داد.