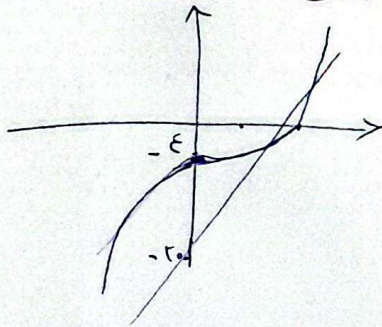


- ١

$$f(x) = \begin{cases} x^2 - 2 & x > a \\ 12x - 20 & x \leq a \end{cases}$$

$$a^2 - \epsilon > 12a - 20 \Rightarrow (a-2)(a+4) \geq 0 \Rightarrow a+4 \geq 0 \Rightarrow \boxed{a \geq -4}$$

مستقيمات مماسات



- ٢

$$f^{-1}(2) = 2 \Rightarrow f(2) = 2$$

$$f(x) = 3(x) + k = 2 \quad k = -10$$

$$\text{الف) } f(x) = 3(x) - 10 = 11$$

$$\text{ب) } f(f(x)) = 3(3x - 10) - 10 = 9x - 30 - 10 = 9x - 40$$

$$y = \frac{ax}{x-1} \Rightarrow ax = yx - y \Rightarrow yx(y-a) \Rightarrow x = \frac{y}{y-a}$$

$$\Rightarrow y = \frac{x}{x-a} \Rightarrow \frac{2a}{a} = a \Rightarrow a = 2$$

- ٣

$$2a = a^2 \Rightarrow a^2 - 2a = 0 \Rightarrow a(a-2) = 0 \quad \begin{matrix} a = 0 \\ a = 2 \end{matrix}$$

- ٤

$$f^{-1}(x) = \{(0, 2), (1, 4), (2, 1), (4, 9)\}$$

$$g^{-1}(x) = \{(2, 2), (4, 8), (0, 6)\}$$

$$\text{الف) } f \circ f^{-1} = \{(0, 0), (1, 1), (2, 2), (4, 4)\}$$

$$\text{ب) } f^{-1} \circ f = \{(2, 2), (1, 1), (4, 4), (9, 9)\}$$

$$\text{ج) } f \circ g^{-1} = \{(2, 0), (0, 6)\}$$

$$\text{د) } g^{-1} \circ f = \{(2, 6), (1, 2), (9, 8)\}$$

- ٥

$$g^{-1} = \{(1, 2), (3, 4), (0, 6)\}$$

$$h = \{(1, 2), (3, 4), (4, 1), (0, 1)\} \Rightarrow \frac{h}{f \circ g^{-1}} = \frac{((1, 2), (3, 4), (0, 1))}{((1, 4), (3, 8), (0, 6))}$$

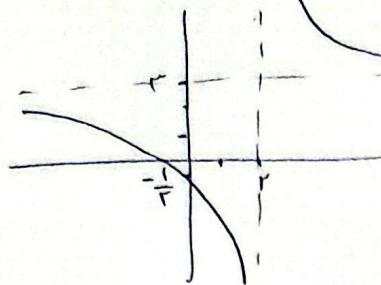
$$f \circ g^{-1} = \{(1, 4), (3, 8), (0, 6)\}$$

$$\frac{h}{f \circ g^{-1}} = \left\{ \left(1, \frac{2}{4}\right), \left(3, \frac{4}{8}\right), \left(0, \frac{1}{6}\right) \right\} = \left\{ \left(1, \frac{1}{2}\right), \left(3, \frac{1}{2}\right) \right\}$$

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

مجاہب افقی $y = \frac{a}{c} = 2$
 مجاہب عمودی $x = 2$

عوارضه مفضل الیہی - ۶

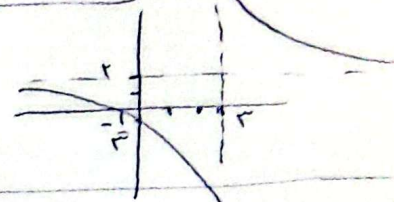


عوارضه مفضل الیہی
 داروں پذیر ✓

$$f^{-1}(n) \Rightarrow n = \frac{2y+1}{y-2} \Rightarrow n(y-2) = 2y+1 \Rightarrow ny - 2n = 2y+1$$

$$\Rightarrow ny - 2y = 2n+1 \Rightarrow y(n-2) = 2n+1 \Rightarrow y = \frac{2n+1}{n-2} \Rightarrow f^{-1}(n)$$

مجاہب افقی $y = \frac{a}{c} = 2$
 مجاہب عمودی $x = 2$

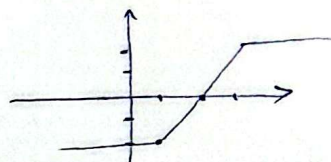


$n > 2$
 $1 \leq n \leq 2$
 $n < 1$

$n-1-n+2-2$
 $n-1+n-2=2n-3$
 $-n+1+n-2=-2$

عوارضه مفضل الیہی - ۷

$b=2$
 $a=1$

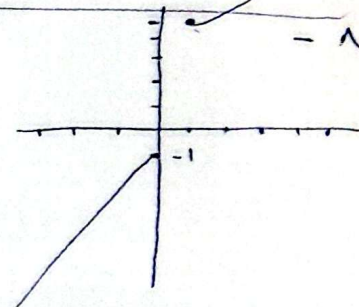


$y = 2n-1 \Rightarrow 2n = y+1$
 $n = \frac{y+1}{2} \Rightarrow y = \frac{2n+1}{1}$

$f(n) = \begin{cases} 2n+1 & n \geq 1 \\ 2n-1 & n \leq 0 \end{cases}$

n	1	2	3	4
y	3	5	7	9

n	0	-1	-2	-3
y	-1	-3	-5	-7



هر خط موازی محور n فقط در یک نقطه قطع می کند => داروں پذیر

$y = 2n+1 \Rightarrow n = \frac{y-1}{2} \Rightarrow y = 2n+1$

$y = \sqrt{2n-1}$

$\sqrt{2n-1} \geq 1 \Rightarrow 2n-1 \geq 1 \Rightarrow n \geq 1$

$y = 2n-1 \Rightarrow n = \frac{y+1}{2} \Rightarrow y = 2n-1 \Rightarrow y = \frac{2n+1}{1}$

$\frac{2n+1}{1} \leq 0 \Rightarrow 2n+1 \leq 0 \Rightarrow n \leq -1$

$y = \frac{2^2(n+2) - 2^2 - 1 - 2n^2 - 2n}{n+2}$
 $\Rightarrow y = \frac{4n+8-4-1-2n^2-2n}{n+2} = \frac{-2n^2+2n+3}{n+2}$

$n = \frac{-2y-1}{2}$
 $y(n+2) = -1-2y-9$
 $yn+2y = -1-2y-9$
 $yn = -10-4y$
 $n = \frac{-10-4y}{y}$

$\frac{-2n-1}{n+2} = \frac{a+b}{c+d}$
 $a = -2, b = -1, c = 1, d = 2$
 $f^{-1}(b) = \frac{ab+b}{cb+cd}$

$\frac{-2(-1)-1}{-1+2} = \frac{1-1}{1} = 0$

عارة فضل الربي

$$f(n) = \frac{n}{n^r + 1} \quad \text{وإذا} \quad \Rightarrow \quad n = \frac{y}{y^r + 1} \quad \Rightarrow \quad ny^r + n = y$$

$$\Rightarrow ny^r - y + n = 0 \quad \Rightarrow \quad y = \frac{1 \pm \sqrt{(1)^r - 4(n)(n)}}{2n}$$

$$\Rightarrow y = \frac{1 \pm \sqrt{1 - 4n^2}}{2n} \quad \Rightarrow \quad f^{-1}(n) = \frac{1 \pm \sqrt{1 - 4n^2}}{2n} \quad \Rightarrow \quad n \in \left[-\frac{1}{2}, \frac{1}{2}\right], n \neq 0$$