

$f \begin{cases} \sqrt{x-x^2} & x \geq 0 \\ \sqrt{x+x^2} & x < -1 \end{cases} \Rightarrow f' \begin{cases} \frac{-2x+1}{2\sqrt{x-x^2}} & x \geq 0 \\ \frac{2x+1}{2\sqrt{x^2+x}} & x < -1 \end{cases}$

$\Rightarrow x = \frac{1}{2}$ (در این جا) $\Rightarrow x = -\frac{1}{2}$

$\Rightarrow \begin{matrix} -1 & 0 & +\frac{1}{2} & +1 \\ | & | & | & | \\ \hline & + & - & + \end{matrix}$

$m = \downarrow \epsilon$ $n = \uparrow \epsilon$ $k = \text{در این جا} \Rightarrow 0 > \pm 1$

$\min + k = 0$

$x \geq 0 \quad f' = \frac{1}{\sqrt{x}} - \frac{x}{\sqrt{x-x^2}} \Rightarrow f(x) = a - 2x \quad x = \frac{a}{4}$

$a - 2x = 0 \Rightarrow x \leq \frac{a}{2}$

$\frac{a}{4} \quad \frac{a}{2}$

$\sqrt{a} \quad \sqrt{\frac{a}{4}} + \sqrt{a - \frac{a}{4}} \quad \sqrt{\frac{a}{4}}$

$x a^2 = x^2 \quad a = x$

$f(x) = \frac{x^2}{x^2-1} \Rightarrow f'(x) = \pm \frac{(2x^2 - 1)(x^2-1) - (x^2)^2}{(x^2-1)^2}$

$\rightarrow \pm (2x^2 - 1)(x^2-1) - x^4 = 0$

$\rightarrow \pm (2x^4 - 2x^2 + x^2 - 1) - x^4 = 0$

$\rightarrow \pm (x^4 - x^2 - 1) = 0$

$\rightarrow \pm (x^2 - 1)(x^2 + 1) = 0$

$\rightarrow \begin{cases} \pm x = 0 \rightarrow x = 0 \\ \pm (x^2 - 1) = 0 \rightarrow x = \pm 1 \end{cases}$

$\text{این سه جای قابل توجه است} \leftarrow \pm 1 \leftarrow \text{ext} \leftarrow \text{نقطه استیلاست}$

$a = 0 \quad f' = 3ax^2 + 2bx + c$

$c = 0$

$\begin{cases} 3a + 2b = 0 \\ a + b = 1 \\ -2a - 2b = -2 \end{cases} \Rightarrow \begin{matrix} a = -2 \\ b = 3 \end{matrix} \quad ab = -6$

$f \begin{cases} 3x-x^3 & x > \sqrt{3} \\ -3x+x^3 & x < -\sqrt{3} \end{cases} \Rightarrow f' \begin{cases} 3-3x^2 & x > \sqrt{3} \\ -3+3x^2 & x < -\sqrt{3} \end{cases}$

$\Rightarrow x = \pm \sqrt{3}$

$\begin{matrix} -\frac{\sqrt{3}}{3} & -1 & +1 & \sqrt{3} \\ \hline -\frac{a}{3} & -2 & +2 & 0 \end{matrix}$

$\boxed{-2}$

$$f(x) = x^3 + 3ax^2 + b \quad x > 0$$

$$-x^3 + 3ax^2 + b \quad x < 0$$

$$f'(x) = 3x^2 + 6ax \quad x > 0$$

$$-3x^2 + 6ax \quad x < 0$$

↓

$$x = -1 \quad \frac{b}{a} = -1 \quad \checkmark$$

$$-\frac{1}{x} + b = \frac{1}{x} \quad b = \frac{2}{x}$$

$$-3 - 6a = 0 \quad a = -\frac{1}{2}$$

$$y_{\min} = \frac{-1}{x} \quad y_{\min} = \frac{x}{1} \times \frac{1}{x} = \frac{1}{x} + \frac{1}{x} = \frac{2}{x}$$

$$y_{\min} = \frac{1-a}{a+1} = \frac{-1}{x} \quad -a-1 = x-3a$$

$$a = x$$

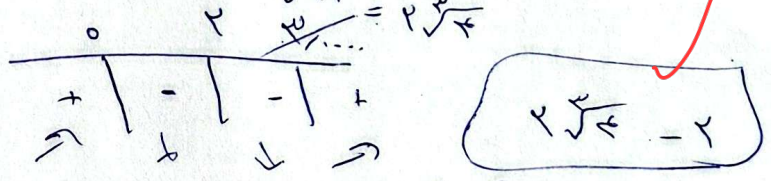
$$y = \frac{2x+3}{x+1} \Rightarrow 2x+3 = x+1 \rightarrow y = \frac{x+2}{x+1} \rightarrow y = 1 + \frac{1}{x+1} \rightarrow a = -\frac{1}{x}$$

$$x = -\frac{1}{x} \Rightarrow 1 - \frac{1}{x}a + 1 = 0 \quad a = x$$

$$y = \frac{bx^2 + 3}{x^2 + 1} \quad x \rightarrow +\infty$$

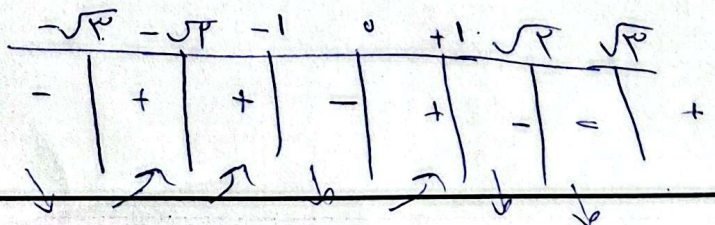
$$\frac{b}{x^2} = x \quad b = 1x$$

$$f' = \frac{3x^2(x^2-1) - x^3(2x^2)}{(x^2-1)^2} = \frac{3x^4 - 3x^2 - 2x^5}{(x^2-1)^2}$$



$$f' = \frac{3x^2(x^2-3) - 2x(x^2-3)}{(x^2-3)^2} = \frac{3x^4 - 9x^2 - 2x^3 + 6x}{(x^2-3)^2}$$

1.5



$$f'(x) = \frac{12x^3(x^2-4) - 2x(2x^2-4)}{(x^2-4)^2} = \frac{12x^3(12x^2-9x^2) - (2x^2-4)}{(x^2-4)^2}$$

$$12x^3 - 12x^3 + 4x = 0 \rightarrow 12x^3(12x^2-9x^2) = 0 \rightarrow \{x=0$$

$$\rightarrow 2x^2 - 9x^2 + 4 = 0 \xrightarrow{x^2=t} t^2 - 9t + 4 = 0 \rightarrow t = \frac{9 \pm \sqrt{81-16}}{2} = 3 \pm \sqrt{5} \rightarrow \begin{cases} x = \pm \sqrt{3-\sqrt{5}} \\ x = \pm \sqrt{3+\sqrt{5}} \end{cases} \text{ در } \mathbb{R}$$

x	$-\sqrt{3}$	$-\sqrt{3-\sqrt{5}}$	0	$\sqrt{3-\sqrt{5}}$	$\sqrt{3}$
y'	$-$	$+$	$+$	$-$	$+$

در $x=0$ بازه $(-\infty, 0)$ نزولی