

$$f(x) = \sqrt{x(1-|x|)} \rightarrow x(1-|x|) \geq 0 \rightarrow \begin{array}{c} -1 & 0 & +1 \\ + & - & + \end{array} \quad (1)$$

$$f(x) = \begin{cases} x > 0 \rightarrow \sqrt{x-x^2} \rightarrow f' = \frac{1-2x}{2\sqrt{x-x^2}} \\ x < 0 \rightarrow \sqrt{x+x^2} \rightarrow f' = \frac{1+2x}{2\sqrt{x+x^2}} \end{cases} \quad D_f = (-\infty, -1] \cup \{0\} \cup [0, 1]$$

$$f'(x) = \frac{1-2|x|}{2\sqrt{x(1-|x|)}} \rightarrow 1-2|x| = 0 \rightarrow x = \begin{cases} \frac{1}{2} \checkmark \\ -\frac{1}{2} \checkmark \end{cases}$$

$$[0, 1] \rightarrow \frac{1-2x}{2\sqrt{x-x^2}} \quad 1-2x > 0 \rightarrow x < \frac{1}{2}$$

x	0	1/2	1
f'	+	-	
f	↗	↘	

K=3

$$(-\infty, -1] \rightarrow \frac{1+2x}{2\sqrt{x+x^2}} \quad x < -1 \rightarrow \text{خارج از دامنه}$$

x	1/2
y'	+
y	↗

max

نقاط صفر و ±1 ← بحرانی  
K=3  
M+N+K=5

$$K+m+n = 3 + \frac{1}{2} = \boxed{\frac{7}{2}}$$

$$f(x) = \sqrt{x} + \sqrt{a-2x}$$

$$f(x) = \sqrt{x} + \sqrt{a-2x} \rightarrow \begin{cases} x > 0 \\ a-2x > 0 \end{cases} \rightarrow x \leq \frac{a}{2} \rightarrow 0 \leq x \leq \frac{a}{2}$$

$$f'(x) = \frac{1}{2\sqrt{x}} - \frac{1}{\sqrt{a-2x}} \xrightarrow{y=0} \frac{1}{2\sqrt{x}} = \frac{1}{\sqrt{a-2x}} \rightarrow x = \frac{a}{4}$$

$$\begin{cases} x=0 \rightarrow y=f(0)=\sqrt{a} \\ x=\frac{a}{4} \rightarrow y=f(\frac{a}{4})=\sqrt{\frac{a}{4}} \rightarrow \min \\ x=\frac{a}{2} \rightarrow y=f(\frac{a}{2})=\sqrt{\frac{a}{2}} \rightarrow \max \end{cases}$$

min x max = \sqrt{1/2} \rightarrow \sqrt{\frac{a^2}{1/2}} = \sqrt{2a} \rightarrow \frac{2a}{\sqrt{2a}} = \sqrt{2a}

Ka=1/2 \rightarrow a=f \rightarrow [a]=f

$$f(x) = \frac{x^r}{x^r-1} \quad |x^r-\epsilon| \rightarrow \begin{array}{c} -r & +r \\ + & - \end{array} \quad (r)$$

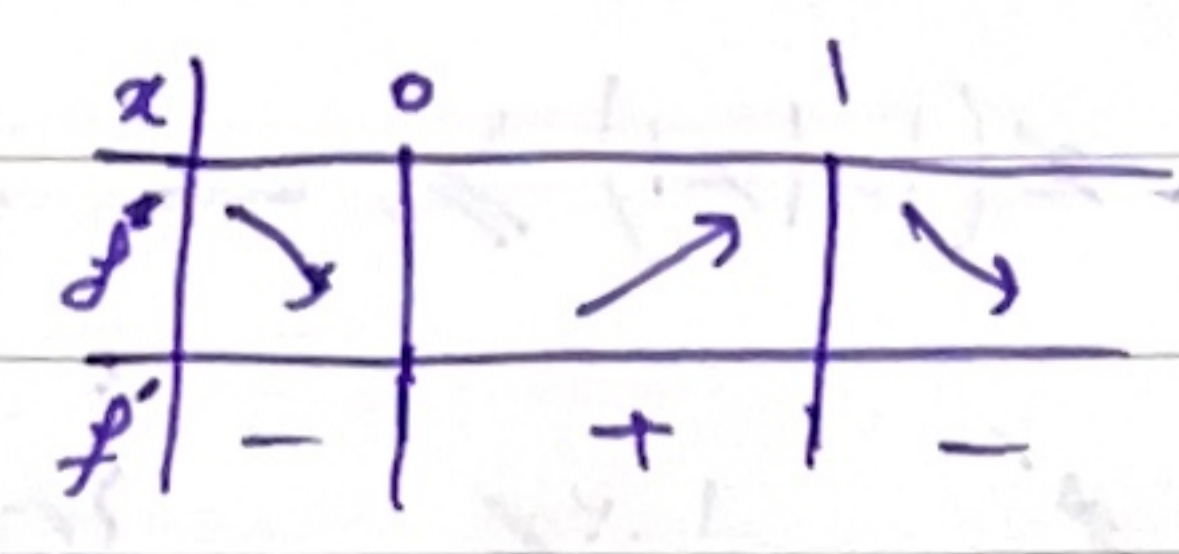
$$I \quad x > 1 \rightarrow \frac{x^r(\epsilon-x^r)}{x^r-1} \rightarrow \frac{\epsilon x^r - x^{2r}}{x^r-1} \rightarrow f'(x) = \frac{(\epsilon x^r - 2x^{2r})(x^r-1) - x^r(\epsilon x^r - x^{2r})}{(x^r-1)^2}$$

$$II \quad x < 1 \rightarrow \frac{x^r(x^r-\epsilon)}{x^r-1} \rightarrow \frac{x^{2r} - \epsilon x^r}{x^r-1} \rightarrow f'(x) = \frac{(\epsilon x^r - 2x^{2r})(x^r-1) - x^r(x^{2r} - \epsilon x^r)}{(x^r-1)^2}$$

$$\rightarrow f'(x) = \pm \frac{(\epsilon x^r - 2x^{2r})(x^r-1) - (x^{2r} - \epsilon x^r)x^r}{(x^r-1)^2} \rightarrow \pm (\epsilon x^r - 2x^{2r} + \epsilon x^r) = 0 \rightarrow \begin{cases} \pm \epsilon x^r = 0 \rightarrow x=0 \\ \pm \epsilon x^r - 2x^{2r} + \epsilon x^r = 0 \rightarrow x \text{ بحرانی} \end{cases}$$

م = بحرانی است ← x ← ±1 ← بحرانی است

$y = ax^3 + bx^2 + cx + d \rightarrow d = 0$   
 $y' = 3ax^2 + 2bx + c \rightarrow c = 0$



نقطہ min ← A(0,0)  
 نقطہ max ← B(1,1)

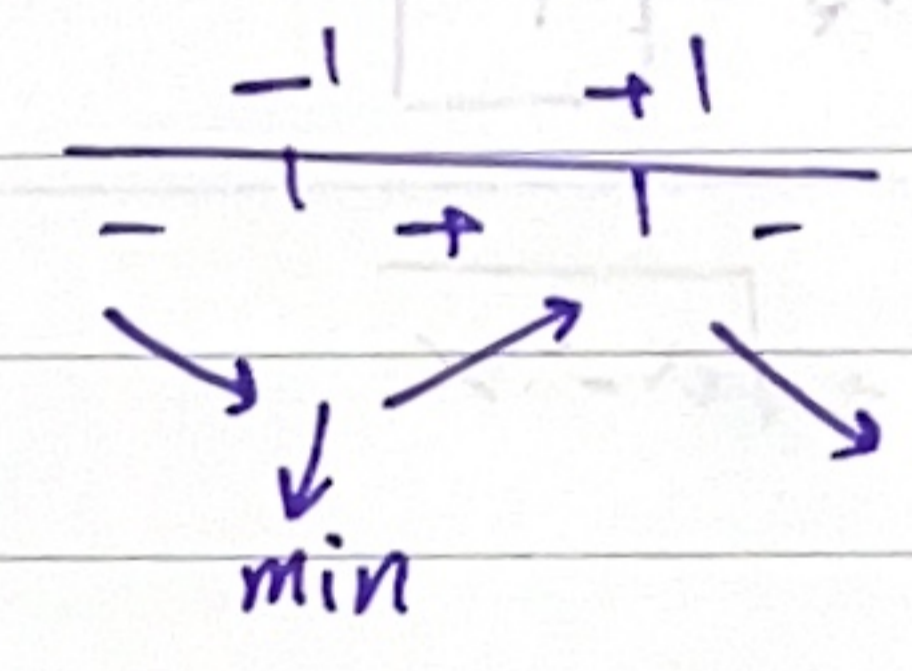
$1 = a + b$

$3ax^2 + 2bx = 0 \rightarrow x(3ax + 2b) = 0$   
 $3a + 2b = 0$   
 $2a + 2b = 2$   
 $a = -2$   
 $b = +3$

$ab = -6$

2

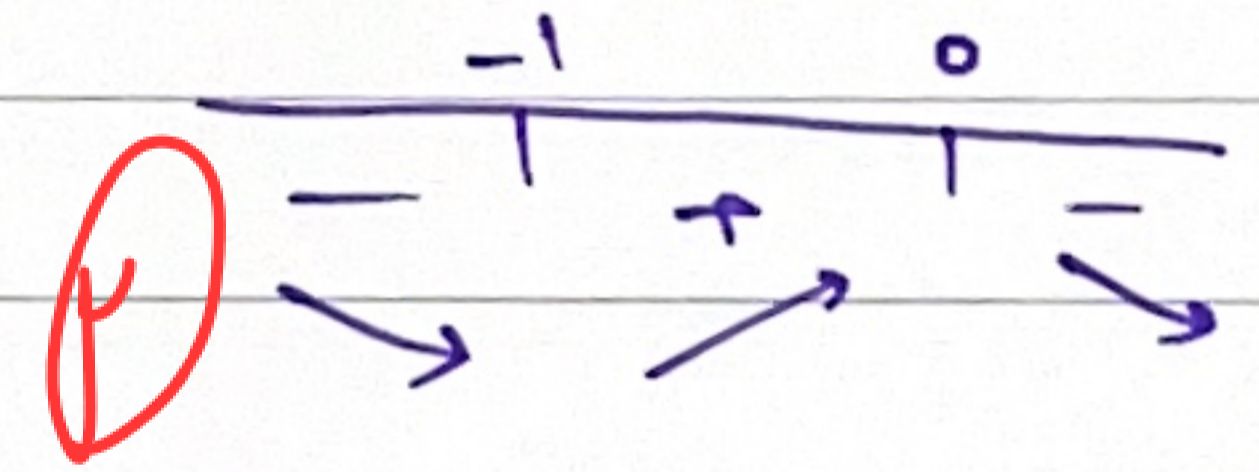
$f(x) = x|x^3 - 3x^2|$   
 $x > \sqrt{3} \rightarrow x^3 - 3x^2$   
 $x < \sqrt{3} \rightarrow 3x^2 - x^3$   
 $f'(x) = 3 - 3x^2 \rightarrow 3(1 - x^2)$



min | -1  
-2

$y = x^2|x| + 3ax^2 + b$   
 $b = +\frac{3}{2}$   
 چون نقطہ A(-1,0) کے انفرم نیبی اسے پس لگاؤ!  
 منحنی برحقہ ذریعہ و بعد مشتق کا تکریم

$y' = -x^3 + 3ax^2 + b$   
 $y' = -3x^2 + 4ax$   
 $-3x(x - \frac{4a}{3})$



$1 + (-\frac{3}{2}) + b = 1$

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

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

$y = \frac{(ax+3)}{(a+1)x + (a-1)}$   
 $4x - 1 = 0 \rightarrow x = \frac{1}{4}$   
 $\frac{a}{a+1} = \frac{1}{4} = \frac{1}{4} + \frac{1}{4} = \frac{1}{2}$   
 $a = -1$

$y = \frac{1}{4}x^2 + x + \frac{1}{4} \rightarrow 3x + 1$   
 min | -1/4  
1/4

$\frac{3}{4} - \frac{3a}{4} = -a - 1 \rightarrow 3 - 3a = -a - 1 \rightarrow 3a = 4 \rightarrow a = \frac{4}{3}$

$y = \frac{3x+3}{3x+1} \rightarrow y=0 \rightarrow 3x+3=0 \rightarrow x = -\frac{3}{3} = -1$

$$y = \frac{bx^r + V}{x^r + ax + 1}$$

(1)  
(2)

$$f\left(-\frac{1}{r}\right)^r + a\left(-\frac{1}{r}\right) + 1 = 0 \rightarrow \frac{1}{r}a = r \rightarrow a = r$$

$$\frac{b}{a} = \frac{1r}{r} = r$$

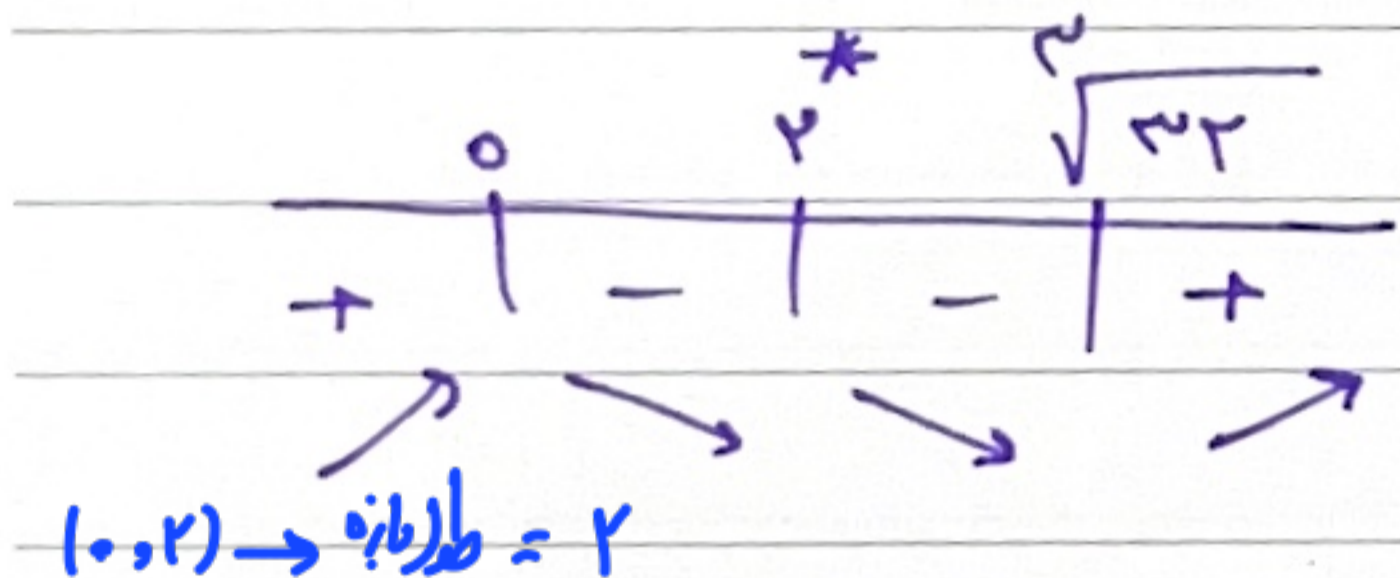
$$\text{کتابت افقی} \rightarrow \lim_{x \rightarrow \infty} \frac{bx^r + V}{x^r + ax + 1} \rightarrow \frac{b}{r} = r \rightarrow b = 1r$$

$$f(x) = \frac{x^r}{x^r - 1} \rightarrow f'(x) = \frac{rx^{r-1}(x^r - 1) - x^r(x^r)}{(x^r - 1)^2}$$

(4)  
(1, 1.5)

تابع در بازه (0, 1) و (1, \sqrt[3]{32}) و (1, \sqrt[3]{32}, \infty) را بررسی کنید

$$\rightarrow \frac{x^r (rx^{r-1} - x^r)}{(x^r - 1)^2} \rightarrow \frac{x^r (x^r - r)}{(x^r - 1)^2}$$



~~min~~

\sqrt[3]{32} نقطه ای که نمودار در آن به min خود می رسد.

0 کمتر می شود یعنی در آن تابع حالت آلفا نزدیک دارد.

$$(1, \sqrt[3]{32}) \rightarrow \text{طول بازه} = r \rightarrow \text{طول بازه} = r(\sqrt[3]{32} - 1) < r \rightarrow \text{min} = r(\sqrt[3]{32} - 1)$$

(1)

$$f(x) = \frac{x^r - r}{x^r - r} \rightarrow f'(x) = \frac{rx^{r-1}(x^r - r) - x^r(x^r)}{(x^r - r)^2}$$

(2)

$$\rightarrow \frac{rx^{2r} - 12x^r + 4x}{(x^r - r)^2} \rightarrow \frac{2x^{2r} - 12x^r + 4x}{(x^r - r)^2}$$

