

تعداد معبر - بالترتیب تعیین تکلیف

Date:

Sub:

تعداد نقاط k / تعداد معبر n / تعداد معبر m

$$f(x) = \sqrt{x(1-|x|)}$$

$$f(x) = \begin{cases} \sqrt{x(1-x)} & 0 \leq x \leq 1 \\ \sqrt{x(1+x)} & x \leq -1 \end{cases} \quad f'(x) = \begin{cases} \frac{1-2x}{2\sqrt{x(1-x)}} & 0 < x < 1 \\ \frac{1+2x}{2\sqrt{x(1+x)}} & x < -1 \end{cases}$$

تعداد معبر $n=0$ / تعداد نقاط $k=2$ / تعداد معبر $m=1$

$$\rightarrow m + n + k = 5$$

۲- حاصل ضرب بیشترین مقدار در کمترین مقدار $f(x) = \sqrt{x} + \sqrt{a-2x}$ $\alpha > 0$

$$D_f = \begin{cases} x \geq 0 \\ a - 2x \geq 0 \rightarrow x \leq \frac{a}{2} \end{cases} \quad [0, \frac{a}{2}]$$

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

$$\rightarrow \sqrt{a-2x} = 2\sqrt{x} \rightarrow a-2x = 4x \rightarrow a = 6x \rightarrow x = \frac{a}{6}$$

x	0	$\frac{a}{6}$	$\frac{a}{2}$
$f(x)$	\sqrt{a}	$\sqrt{\frac{a}{6}}$	$\sqrt{\frac{a}{2}}$

$\rightarrow \max \times \min = \sqrt{\frac{a}{6}} \times \sqrt{\frac{a}{2}} = \sqrt{\frac{a^2}{12}} = \frac{\sqrt{3a}}{2}$

۳- تعداد نقاط استوفا $f(x) = \frac{x^r}{x^r-1} |x^r - k|$ $x = \pm r$ / $x = \pm \sqrt[k]{k}$

$$f(x) = \begin{cases} \frac{x^r}{x^r-1} (x^r - k) & x \geq r \\ \frac{-x^r}{x^r-1} (x^r - k) & -r < x < r \end{cases} \quad f'(x) = \begin{cases} \frac{k_2(x^r - k_2^r + k)}{+(x^r-1)^2} & x \leq -r \\ \frac{k_2(-x^r + k_2^r - k)}{(x^r-1)^2} & -r < x < r \end{cases}$$

x	$-\infty$	$-r$	-1	0	1	r	$+\infty$
f'		-	+	+	-	-	+
f		\searrow	\nearrow	\nearrow	\searrow	\searrow	\nearrow

$$y' = 3ax^2 + 2bx + c = 0 \xrightarrow{x=0} c=0 \xrightarrow{x=1} 3a+2b+c=0 \xrightarrow{c=0} 3a+2b=0 \rightarrow a = -\frac{2b}{3} \xrightarrow{b=3} a = -2$$

$$y = -\frac{2b}{3}x^3 + bx^2 + d \xrightarrow{A(0,0)} d=0 \xrightarrow{B(1,1)} y = -\frac{2b}{3} + b + d = 1 \xrightarrow{d=0} \frac{1}{3}b = 1 \rightarrow b = 3$$

Date: $y' = 3ax^2 + 2bx + c$ sub:

$$a \times b = -2 \times 3 = -6$$

$y = ax^3 + bx^2 + cx + d$ تقابلاً استعملنا $B(1,1)$ $A(0,0)$ - 4

$$f(0) = 0 \rightarrow d = 0 \quad ab = -2 \quad (1)$$

$$f'(0) = 0 \rightarrow c = 0$$

$$f(1) = 1 \rightarrow a + b = 1 \rightarrow a = -1$$

$$f'(1) = 0 \rightarrow 3a + 2b = 0 \rightarrow 3a + b = 0 \rightarrow b = -3a \rightarrow b = 3$$

min $[-1, 0, \sqrt{3}]$ $f(x) = x|3-x^2| - 4$

$$f(x) = \begin{cases} -x(3-x^2) & x \geq \sqrt{3} \\ x(3-x^2) & x \leq -\sqrt{3} \end{cases} \rightarrow f'(x) = \begin{cases} 3x^2 - 3 = 0 & x \geq \sqrt{3} \\ -3x^2 + 3 & x \leq -\sqrt{3} \end{cases}$$

$$x(3-x^2) \quad -\sqrt{3} < x < \sqrt{3}$$

$$f'(-\sqrt{3}) = 4 \quad f'(\sqrt{3}) = -4$$

$$f'(-1) = -4 \quad f'(1) = 4$$

$$\frac{-3b}{a} = 2 \quad y = x|x| + ax^2 + b \quad A(-1,1) - 4$$

$$y' = -3a^2 + 4ax$$

$$f(-1) = 1 \rightarrow -1 + 3a + b = 1 \rightarrow 3a = b \rightarrow b = \frac{3}{4}$$

$$f'(-1) = 0 \rightarrow -3 - 4a = 0 \rightarrow a = -\frac{1}{4}$$

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$$a_{min} = \frac{-b}{r} = \frac{-1}{r(\frac{r}{r})} = \frac{-1}{r}$$

$$\text{Kapan } y = 0 = \frac{-d}{c} = \frac{-a}{a+1} = \frac{-1}{r} \rightarrow r \cdot r = -a-1 \rightarrow r = -a-1 \rightarrow a = r$$

$$\rightarrow y = \frac{rx+r}{r+1} \xrightarrow{y=0} rx+r=0 \rightarrow x = \frac{-r}{r}$$

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

$$\text{Kapan } \lim_{x \rightarrow \infty} \frac{bx^r + u}{rx^r + ax + u} \rightarrow \frac{b}{r} = r \rightarrow b = r^2$$

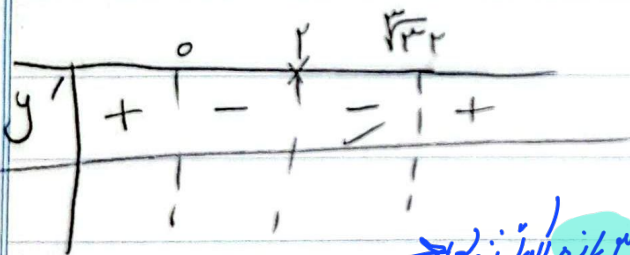
$$\frac{b}{a} = \frac{r^2}{r} = r$$

Minimum pada $x = \frac{1}{r}$

$$f(x) = \frac{x^r}{r}$$

$$y' = \frac{r x^{r-1} (x^r - 1) - r x^r (x^r)}{(x^r - 1)^2}$$

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



$(r, \sqrt{r}) \rightarrow \sqrt{r} - r$
 Minimum pada $x = \sqrt{r}$

$$y' = \frac{-\sqrt{r}}{r} \cdot \frac{-\sqrt{r}}{r} \cdot \frac{\sqrt{r}}{r} \cdot \frac{\sqrt{r}}{r}$$

Titik belok

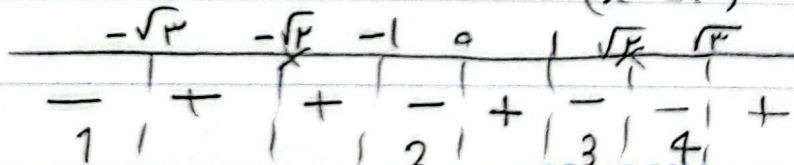
$$f(x) = \frac{x^r - r}{x^r - r}$$

$$x \in (-r, r) - 1$$

$$y' = \frac{r x^{r-1} (x^r - r) - r x (x^r - r)}{(x^r - 1)(x^r - r)(x^r - r)^2}$$

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

$$= \frac{r x (x^r - r + r)}{x^r - r}$$



$$r x^r - r x^r + r x = 0 \rightarrow r x (x^r - r + r) = 0 \rightarrow \{x = 0\}$$

$$x = \pm \sqrt{r-1}$$

$$\rightarrow x^r - r x^r + r = 0 \xrightarrow{x^r = t} t^r - r t + r = 0 \rightarrow t = \frac{r \pm \sqrt{r^2 - 4r}}{r} = 1 \pm \sqrt{1 - \frac{4}{r}}$$