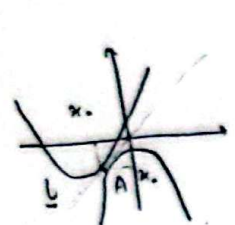


۱- متوسط تغییر آهنگ $[a, b] = \frac{f(b) - f(a)}{b - a} \rightarrow$ آهنگ تغییر $[1, 3] = \frac{1 - \frac{a}{3} - (-1 + \frac{a}{1})}{2} = \frac{a}{3}$

تساوی دو عبارت فوق $\frac{a}{3} = \frac{a}{x^2} \rightarrow a = \pm \sqrt{3}$

$f'(x) = \frac{a}{x^2}$

۲- 

$f(x) = \gamma a x^2 - \delta x + 1 \Delta a$
 $f'(x) = f' a x - \delta \xrightarrow[\text{نقطه } y=x]{\text{بالاترین مقدار}}$ $f' a x_0 - \delta = 1 \rightarrow f' a x_0 = \gamma \rightarrow x_0 = \frac{\gamma}{\gamma a}$

$f(x_0) = x_0 \rightarrow \gamma a x_0^2 - \delta x_0 + 1 \Delta a = x_0 \rightarrow \frac{9}{\gamma a} - \frac{10}{\gamma a} + 1 \Delta a = \frac{\gamma}{\gamma a}$

$1 \Delta a = \frac{9}{\gamma a} \rightarrow a^2 = \frac{1}{\gamma} \rightarrow a = \pm \sqrt{\frac{1}{\gamma}}$

۳- $f(x) = x^3 - 12x + 2 \xrightarrow{(1)'} f'(x) = 3x^2 - 12 \rightarrow f'(x) = 3(x^2 - 4) \xrightarrow{\pm 2}$

$f(2) = 8 - 24 + 2 = -14 \xrightarrow{\text{نسبی min}}$

$f(x) = x^3 - 12x + 2$ Sign chart: $-\infty$ to $+\infty$. At $x = -2$, sign changes from $+$ to $-$ (max). At $x = 2$, sign changes from $-$ to $+$ (min).

۴- $f(x) = x^3 + ax^2 - \gamma b x - f \xrightarrow{(1)'} f'(x) = 3x^2 + \gamma a x - \gamma b \xrightarrow[\text{سول}]{\text{از صفر}}$ $f'(-) = 0 \rightarrow b = 0$
 $f'(-2) = 0$

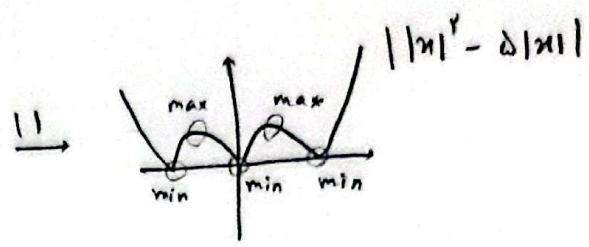
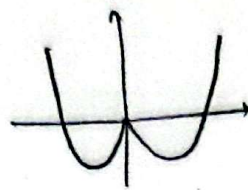
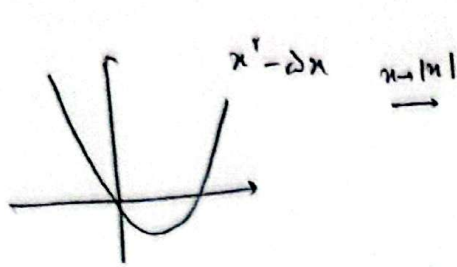
$\rightarrow 12 - \gamma a = 0 \rightarrow a = \sqrt{3}$, $f(x) = x^3 + 3x^2 - f$

$f(x) = x^3 + 3x^2 - f$ Sign chart: $-\infty$ to $+\infty$. At $x = -2$, sign changes from $+$ to $-$. At $x = -1$, sign changes from $-$ to $+$. At $x = 0$, sign changes from $+$ to $-$. At $x = 1$, sign changes from $-$ to $+$.

فاصله دو اکسترم نسبی: $(-2, 0) \rightarrow \sqrt{(-2)^2 + (f)^2} = \sqrt{4 + f^2} = 2\sqrt{1 + \frac{f^2}{4}}$

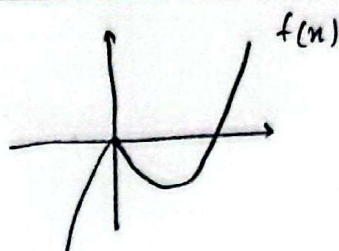
$$f(x) = |x|^r - \Delta |x|, \quad y = | |x|^r - \Delta |x| |$$

-3

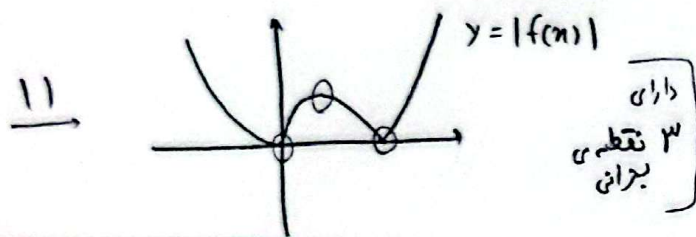


$$\begin{matrix} m = r \\ n = r \end{matrix} \rightarrow \frac{n}{m} = \left[\frac{r}{r} \right]$$

$$f(x) = x|x| + r x \begin{cases} x^r + r x & ; x > 0 \\ -x^r + r x & ; x < 0 \end{cases}$$



-4



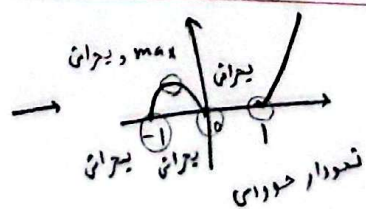
$$f(x) = \sqrt[r]{x^r} |x-a| \xrightarrow{[0, a]} f(x) = (a-x) \sqrt[r]{x^r} \xrightarrow{f'} -x^{\frac{r}{r}} + \frac{r}{r} x^{\frac{r}{r}-1} (a-x)$$

$$\rightarrow x^{-\frac{1}{r}} (-x + \frac{r}{r} (a-x)) = \frac{-\frac{\Delta}{r} x + \frac{r}{r} a}{r \sqrt[r]{x}} \rightarrow -\frac{\Delta}{r} x + \frac{r}{r} a = 0 \quad \begin{matrix} \text{ریشه} \\ \text{معادله} \\ \text{max} \\ \text{است} \end{matrix}$$

$$-\frac{\Delta}{r} x = -\frac{r}{r} a \rightarrow x_0 = \frac{r a}{\Delta}, \quad f(x_0) = 1/0 \rightarrow \sqrt[r]{\frac{r a^r}{r \Delta}} \left(\frac{r a}{\Delta} \right) = \frac{r}{r} \rightarrow a = \left[\frac{\Delta}{r} \right]$$

-5

$$f(x) = \sqrt{x|x| - x} \begin{cases} x > 0: \sqrt{x^r - x} \\ x < 0: \sqrt{-x^r - x} \end{cases}$$



-6

$$\begin{matrix} m = 1 \\ n = 0 \\ k = f \end{matrix} \quad \frac{k m + b}{k - x} = \left[\right]$$

$$f(x) = \frac{mx + r}{x - 1 + m} \xrightarrow{(1)'} f' = \frac{n(m-1) - r}{(x+m-1)^2} = \frac{m^2 - m - r}{(x+m-1)^2} \rightarrow m^2 - m - r = 0 \rightarrow (m-r)(m+1) = 0$$

-9

شماره مثبت

$$\frac{-1 \oplus r}{+ \quad - \quad +} \rightarrow -1 < m < r \rightarrow m = 0, 1$$

در مقدار

$$f(x) = \frac{x}{1-x|x|} \Rightarrow f(x) = \begin{cases} \frac{x}{1-x^2} & x > 0 \\ \frac{x}{1+x^2} & x < 0 \end{cases} \xrightarrow{(1)'} f'(x) = \begin{cases} \frac{x^2+1}{1-x^2} & x > 0 \\ \frac{1-x^2}{1+x^2} & x < 0 \end{cases}$$

-10

نقاط
 $\Rightarrow x = \{1, -1\}$

برابر
 [مشتق = 0 یا
 مشتق ندارد]