$f(x)=1-\frac{a}{x}$ $\quad f(1)=1-a$ $\quad f(2)=1-\frac{a}{2}$ (۲)

$\frac{(1-\frac{a}{2})-(1-a)}{2-1}=\frac{a}{2}$ $\quad f'(x)=\frac{a}{x^2}=\frac{a}{2}\Rightarrow x=\pm\sqrt{2}$ (۱)

$\Rightarrow x=\sqrt{2}$ قبول $\quad a=-\sqrt{2}$ قبول ✓

$y=2ax^2-5x+18a \Rightarrow f'(x)=4ax-5=1 \Rightarrow 4ax=6 \Rightarrow ax=\frac{3}{2}$

$y=2ax^2-5x+18a=3x-9x+18a$ (۲)

$y=3x-9x+18a=0 \Rightarrow 18a=3x \Rightarrow x=6a$ $\quad 6a^2=\frac{3}{2}\Rightarrow a^2=\frac{1}{4}\Rightarrow a=\begin{cases}\frac{1}{2} & \text{قبول}\\ -\frac{1}{2} & \text{قبول}\end{cases}$ ✓ (۲)

$y=x^3-12x+2 \Rightarrow f'(x)=3x^2-12=0 \Rightarrow x^2=4\Rightarrow x=\pm2$

x	-2		2
f'	$+$	$-$	$+$
f	↗	↘	↗

$\min$ نسبی $\Big|_{-16}^{2}$ ✓ (۲)

$y_{\min}=-16$ (۳)

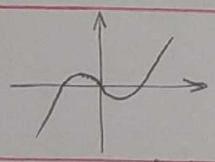
$y=x^3+ax^2-2bx-4 \Rightarrow f'(x)=3x^2+2ax-2b$ (۲)

$x=0\Rightarrow -2b=0\Rightarrow b=0$ $\quad x=-2\Rightarrow 12-4a-2b=0\Rightarrow 12-4a=0\Rightarrow a=3$

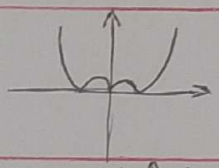
$y=x^3+3x^2-4$ (۲)

$d=\sqrt{(2)^2+(-4)^2}=2\sqrt{5}$ (۴)

$f(x)=x^2-5|x| \Rightarrow \begin{cases}x^2-5x & x\geq 0\\ x^2+5x & x<0\end{cases}$ ✓ (۲)

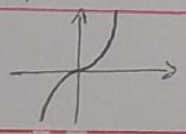


$\Rightarrow |f(x)|$

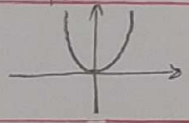


$\frac{12}{16}=\frac{3}{2}$ (۵)

$f(x)=x(|x|+3) \Rightarrow \begin{cases}x^2+3x & x\geq 0\\ -x^2+3x & x<0\end{cases}$ ✓ (۲)



$\Rightarrow |f(x)|$



یک نقطه مجانبی (۲) (۶)

$f(x)=\sqrt[3]{x^2}\,|x-a|^{\text{فرد}} \Rightarrow f(x)=-\sqrt[3]{x^2}(x-a) \Rightarrow f'(x)=-\frac{2x}{3\sqrt[3]{x}}(x-a)-\sqrt[3]{x^2}=\frac{x(a-2)}{\sqrt[3]{x}}$ (۱) (۷)

$f(x_{max})=1.5 \rightarrow f(\frac{2}{5}a)=\frac{3}{2} \rightarrow -\sqrt[3]{\frac{4}{125}a^2}(\frac{2}{5}a-a)=\frac{3}{2} \rightarrow a\times\sqrt[3]{\frac{4}{125}a^2}=\frac{5}{2}$

توان ۳ $\rightarrow a^3\times\frac{4}{125}a^2=\frac{125}{8}\rightarrow a^5=\frac{125}{8}\times\frac{25}{4}=(\frac{5}{2})^5\rightarrow a=\frac{5}{2}=2.5$

$f(x)=\sqrt{x|x|-x} \Rightarrow \begin{cases}\sqrt{x^2-x} & x\geq 0\\ \sqrt{-x^2-x} & x<0\end{cases} \Rightarrow f(x)=\begin{cases}\frac{2x-1}{2\sqrt{x^2-x}}\\ \frac{-2x-1}{2\sqrt{-x^2-x}}\end{cases}$

x	-1		$-\frac{1}{2}$		0		1
f'	$+$	$-$	$\nexists$	$+$	$\nexists$	$+$	
f	↗	↘	$\max$	↗	$\min$	↗	

$\max$ نسبی $\Big|_{-\frac{1}{2}}^{\frac{-1}{2}}$ $\quad \min=0$ نسبی $\quad$ نقاط مجانبی: $\Big|_{0}^{-1}$ ، $\Big|_{0}^{0}$ ، $\Big|_{0}^{1}$ (۸) ۱٫۷۵

$\frac{Km+n}{K-n}=\frac{2(1)+0}{2-0}=1$ (نقطه مجانبی) $K=2$

$y=\frac{mx+2}{x-1+m} \Rightarrow f'(x)=\frac{m(x-1+m)-mx-2}{(x-1+m)^2}=\frac{m^2-m-2}{(x-1+m)^2}$

$f(x)<0 \Rightarrow -1<m<2 \Rightarrow m\in\{0,1\}$ (۲) (۹)

دو عدد صحیح ✓

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

x	-1		1	
f'	$-$	$+$	$+$	
f	↘	↗	↗	

یک نقطه مجانبی (۲) (۱۰)

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