

$$\frac{1 - \frac{a}{x} - 1 + a}{\frac{x-1}{x}} = \frac{\frac{x-a}{x}}{\frac{x-1}{x}} = \frac{x-a}{x-1} = \frac{a}{x}$$

$$1 - \frac{a}{x} \rightarrow 1 - ax^{-1} \xrightarrow{\text{مشتق}} ax^{-2}$$

$$\frac{a}{x} = \frac{a}{x^2} \quad x = \pm \sqrt{a}$$

$$\begin{cases} x = -\sqrt{3} & \times \\ x = \sqrt{3} & \checkmark \end{cases}$$

1, 5

$$\begin{cases} y = x \\ y = 2ax^2 - 4x + 11a \end{cases} \rightarrow 2ax^2 - 4x + 11a = 0$$

$$\Delta = 0 \rightarrow 16 - 4(2a)(11a) = 0$$

$$16 - 88a^2 = 0 \rightarrow a = \pm \frac{1}{\sqrt{11}}$$

انتخاب  $a = \frac{1}{\sqrt{11}}$   $\rightarrow x^2 - 4x + 9 = 0 \rightarrow (x-3)^2 = 0$   
 $x = 3$   $y = 9$   
 عقیق ناقص است

$a = -\frac{1}{\sqrt{11}}$   $\rightarrow -x^2 - 4x - 9 = 0 \rightarrow -(x+3)^2 = 0$   
 $x = -3$   $y = -9$   $\checkmark \checkmark$   $a = -\frac{1}{\sqrt{11}}$

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$$y = x^3 - 12x + 2 \rightarrow y' = 3x^2 - 12$$

x	$-\infty$	-2	2	$+\infty$
y'	+	-	+	
y	$\nearrow$	$\searrow$	$\nearrow$	
		18	-12	

$(-2, 18)$   $(2, -12)$   $\rightarrow$  مقدار =  $(-12)$   $\checkmark$

2

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

$\rightarrow m=3 \quad a=3 \quad b=0 \rightarrow y' = 3x^2 + 4x$   
 $\hookrightarrow y = x^3 + 3x^2 - f$   
 $x = -2 \rightarrow -8 + 12 - f = 0$   $\rightarrow f = 4$   $\rightarrow (-2, 0)$   $\rightarrow$   $(0, -4)$   $\rightarrow$   $\sqrt{4+14} = 2\sqrt{5}$   $\rightarrow$   $2\sqrt{5}$   $\checkmark$

2

$$f(x) = x^3 - \omega|x|$$

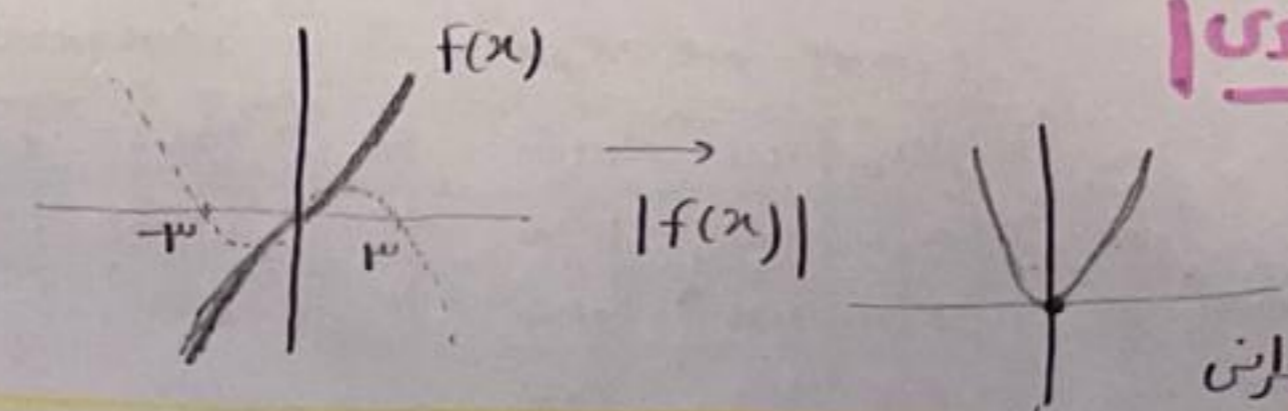
$$\begin{cases} x^3 - \omega x & x \geq 0 \\ x^3 + \omega x & x < 0 \end{cases}$$

$f(x)$   $\rightarrow$   $|f(x)|$

$m=2$   $\rightarrow$   $\frac{3}{2} = \frac{n}{m}$   $\rightarrow n=3$   $\checkmark$

2

$$f(x) = \begin{cases} x^p + px & x \geq 0 \\ -x^p + px & x < 0 \end{cases}$$



اینگونه

$$f(x) = \sqrt[p]{x^p} |x-a| \rightarrow -\sqrt[p]{x^p} (x-a) = f(x)$$

$x=0 \quad x=a \quad x \in [0, a]$

$$f'(x) = \left( \left( \frac{p}{x} x^{\frac{p-1}{p}} \right) (x-a) + \sqrt[p]{x^p} \right) = 0 \rightarrow \frac{p(x-a) + px}{\sqrt[p]{x^p}} = 0 \rightarrow x = \frac{pa}{2}$$

$$f\left(\frac{pa}{2}\right) = \sqrt[p]{\frac{pa^p}{2^p}} \left(\frac{pa}{2}\right) = \frac{p}{2} \rightarrow \sqrt[p]{\frac{pa^p}{2^p}} = \frac{1}{2} \quad \left(\frac{a^p}{2}\right) = \frac{1}{2^p}$$

$$\frac{a}{2} = \frac{1}{2^p} \rightarrow a = 2^{\frac{1}{p}}$$

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

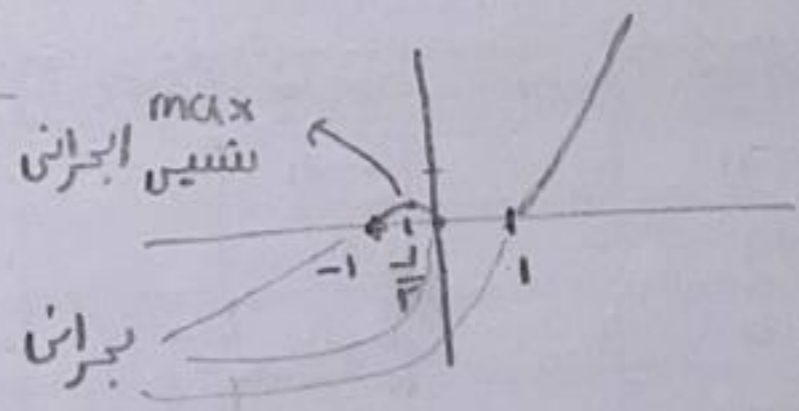
$[-1, 0] \cup [1, +\infty)$

$$x \geq 0 \quad f'(x) = \frac{px-1}{p\sqrt{x^p-x}} = 0 \quad x = \frac{1}{p} \notin D_f$$

$$x < 0 \quad f'(x) = \frac{-px-1}{p\sqrt{-x^p-x}} = 0 \quad x = -\frac{1}{p}$$

0	1
$\times$	$\checkmark$
$\frac{1}{x}$	$+$
$\times$	$\checkmark$
$-\frac{1}{p}$	0
$\times$	$\checkmark$
$+$	$\times$

x	-1	$-\frac{1}{p}$	0	1
f'(x)	0	+	-	0
f(x)	$\times$	$\nearrow$	$\searrow$	$\nearrow$
	0	$\frac{1}{p}$	0	0



$m=1$   
 $n=0$   
 $k=f$

$$\frac{f+0}{f-0} = 1$$

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

$$1-m < 1 \rightarrow m > 0 \rightarrow 0 < m < 2 \rightarrow m = 0, 1$$

مقدار

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

$x=1$  ✓

$x > 0$  →  $\frac{x}{1-x^2}$  →  $\frac{1-x^2 - (-2x^2)}{1-x^2} = \frac{1+x^2}{1-x^2}$

$x < 0$  →  $\frac{x}{1+x^2}$  →  $\frac{1+x^2 - 2x^2}{1+x^2} = \frac{1-x^2}{1+x^2} \rightarrow x = -1$

الجبراسى

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