

۱- $f(x) = x + \sqrt{x-2} \rightarrow f(x-2) = x-2 + \sqrt{x-4}$

معمولاً $x = y-2 + \sqrt{y-4} \xrightarrow{y=x} y = y-2 + \sqrt{y-4} \rightarrow \sqrt{y-4} = 2 \rightarrow y=8$

۲- اتصال به سمت چپ و راست در تنه مقدار فاصله بین ریشه ها کمتر ندارد

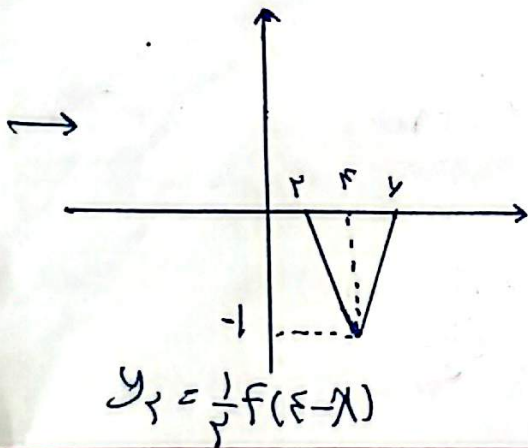
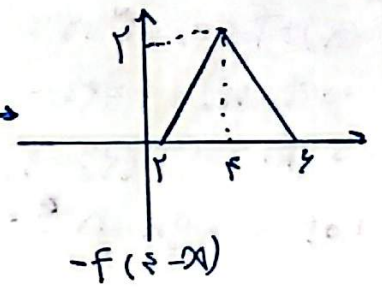
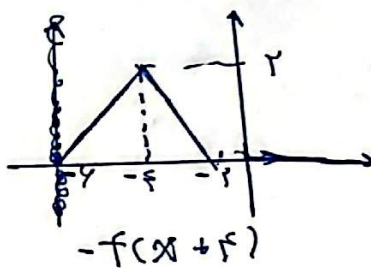
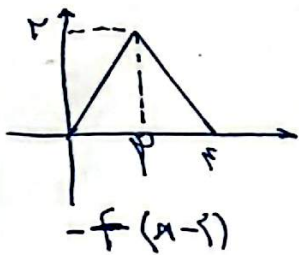
محول $4-0 = 4 \rightarrow 12 \rightarrow \frac{12 \times 2}{2} = 12$

چون می خواهم از $f(x+2)$ به $f(x)$ بروم باید برعکس عمل کنم

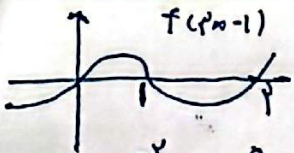
۳- شکم $f(x)$ باید با شکم $f(x-\frac{9}{2})$ برابر باشد $\leftarrow \frac{x-9}{2} = 2 \rightarrow x = 4+9$

$\rightarrow y = 9 + 2f(2) \rightarrow y' = 9-2$

$y = 2x - 1 \xrightarrow{\text{بگذاریم}} y' = 2x' - 1 \xrightarrow{y' = 9-2} 9-2 = 2x'+1-1 \rightarrow x = -4$



۴- اول نمودار $f(x-1)$ را رسم می کنیم



$-(x+2)f(x-1) \geq 0$
 $\rightarrow (x+2)f(x-1) \leq 0$

	-2	0	1	2
$f(x-1)$	-	-	+	-
$x+2$	-	+	+	+
علامت	+	-	+	-

$D = [-2, 0] \cup [1, 2]$

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$$D_g \in \mathcal{D}(u) \text{ , } \mathcal{D}(u) \in D_f$$

$$\rightarrow f \circ g(x) = \{(1, 2), (2, 1)\}$$

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$$D_g \in \mathcal{D}(u) \text{ , } \mathcal{D}(u) \in D_f \rightarrow f \circ g(x) = \{(1, 2), (2, 1), (3, 1)\}$$

$$D_f \in \mathcal{D}(u) \text{ , } \mathcal{D}(u) \in D_g \rightarrow g \circ f(x) = \{(1, 2), (2, 1)\}$$

$$g \circ f(x) - f \circ g(x) = \{(2, 1)\}$$

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$$f \circ f(-\sin^2 x) = \begin{cases} 1 - (-\sin^2 x) & -\sin^2 x \geq 0 \\ 1 - \sin^2 x & -\sin^2 x < 0 \end{cases} \rightarrow \begin{cases} 1 + \sin^2 x & \sin^2 x = 0 \\ \cos^2 x & |\sin^2 x| \geq 0 \end{cases}$$

$$\rightarrow f \circ f(-\sin^2 x) = \begin{cases} 1 & x = 2k\pi + \frac{\pi}{2} \\ \cos^2 x & \text{IR} \end{cases}$$

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$$f(x) + f(y) = f(xy) \rightarrow f(x) = f$$

$$\rightarrow f(x) + f = f(x+y) \rightarrow f(x) \in \mathbb{R} - \mathbb{N}$$

$$\rightarrow f \circ f = f'(f(x+y)) - f' \rightarrow 9x - 1$$

$$f \circ f(x) = 9x - 1 \xrightarrow{x=0} \boxed{y = -1}$$

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$$g \circ f(x) = (x-2)^2 - f'(x-2) + 1 = x^2 - 4x + 5$$

$$f \circ g(x) = f(x^2 - 4x + 1) - 2 = x^2 - 4x + 1$$

$$\rightarrow x^2 - 4x + 1 = x^2 - 4x + 5 \rightarrow x^2 - 4x + 1 - x^2 + 4x - 1 = 0$$

$$\rightarrow 0 = 0 \rightarrow 100 - 100 = 0 \rightarrow \boxed{100}$$