

۱) $Df(x) = [-2, 2]$ و $Df(2x-1) = ?$

$-2 \leq x \leq 2 \xrightarrow{+1} -1 \leq 2x-1 \leq 3 \xrightarrow{\div 2} -\frac{1}{2} \leq x \leq \frac{3}{2}$

$\Rightarrow Df(2x-1) = [-\frac{1}{2}, \frac{3}{2}]$

۲) $Df(2x-1) = [-2, -1]$ و $Df(x) = ?$

$-2 \leq x \leq -1 \xrightarrow{\times 2} -4 \leq 2x \leq -2 \xrightarrow{-1} -5 \leq 2x-1 \leq -3$

$\Rightarrow Df(x) = [-5, -3]$

۳) $f(x) = x + \sqrt{x-2}$ و $f(y) = (y-2) + \sqrt{(y-2)-2}$

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

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

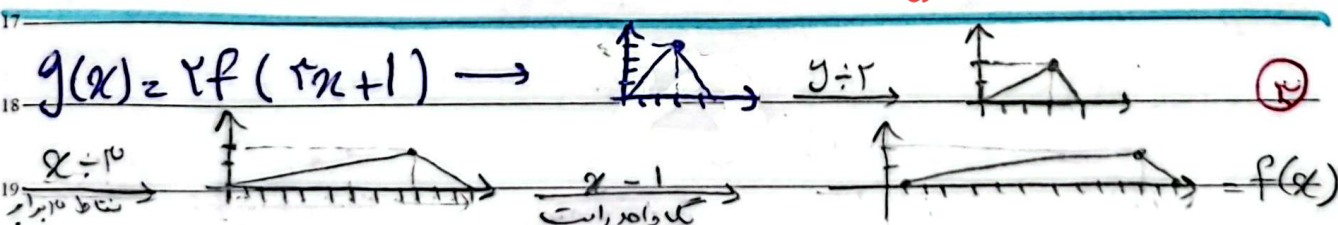
$y = \left(\sqrt{x-4} + \frac{1}{2}\right)^2 + \frac{1}{2} \xrightarrow{\sqrt{\quad}} \sqrt{y - \frac{1}{2}} = \sqrt{x-4} + \frac{1}{2}$

$\xrightarrow{-\frac{1}{2}} \sqrt{y - \frac{1}{2}} - \frac{1}{2} = \sqrt{x-4} \xrightarrow{+2} y - \frac{1}{2} + \frac{1}{2} - \sqrt{y - \frac{1}{2}} = x - 4$

$\xrightarrow{+4} y + \frac{1}{2} - \sqrt{y - \frac{1}{2}} = x \xrightarrow{y=x} x + \frac{1}{2} - \sqrt{x - \frac{1}{2}} = x$

$\xrightarrow{-\frac{1}{2}} x + \frac{1}{2} - \sqrt{x - \frac{1}{2}} = x \xrightarrow{-x} \frac{1}{2} = \sqrt{x - \frac{1}{2}} \xrightarrow{\square} \frac{1}{4} = x - \frac{1}{2}$

$\xrightarrow{+\frac{1}{2}} x = \frac{1}{4} + \frac{1}{2} = \frac{3}{4}$



$S = \text{area of triangle} = \frac{1}{2} \times 2 \times 1 = 1$

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$$A(x, y) \rightarrow y = f(x) \text{ منطبق } y = a + x f\left(\frac{x-a}{x}\right), A' \rightarrow y = 2x - 1 \quad (2)$$

$$A' \Rightarrow (x, 2x - 1) \rightarrow 2x - 1 = a + x f\left(\frac{x-a}{x}\right)$$

$$\rightarrow 2x - (1+a) = f\left(\frac{x-a}{x}\right) \text{ و } A \rightarrow f(x) = x \quad (1, 1, 1)$$

$$\frac{x-a}{x} = x \rightarrow x - a = x^2 \rightarrow x - x + a = x^2$$

$$\frac{2x - (1+a)}{x} = x \rightarrow 2x - 1 - a = x^2 \rightarrow \begin{cases} x - x + a = x^2 \\ 2x - a = 1 \end{cases} \Rightarrow \begin{cases} x = 1 \\ a = -1 \end{cases}$$

$$y = -f(x - x) \Rightarrow y = \frac{1}{x} f(x - x) = ? \quad (3)$$

$$y = f(x - x) \quad y = f(x)$$

$$y = f(x + x) \quad y = f(-x + x)$$

$$y = \frac{1}{x} f(x + x) \rightarrow ?$$

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$$f(x) \Rightarrow y = \sqrt{-(x+1)f(2x-1)} \quad (4)$$

$$f(x-1) \quad f(2x-1)$$

$$\frac{x-1}{x} \rightarrow \frac{1}{x} \rightarrow \frac{1}{x}$$

$$\Rightarrow -(x+1) \times f(2x-1) \geq 0 \rightarrow (x+1) \times f(2x-1) \leq 0 \quad (5)$$

$$\Rightarrow Df = [2, 0] \cup [1, 2]$$

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1 $f(x) = |2x - 3| + 1$ (حل برقرار روی محور است) $x=0$ (نیست) $x=0$ (است) (✓)

2 $x=0 \rightarrow f(0) = |-3| + 1 = 4 \rightarrow (0, 4)$ نقطه برقرار

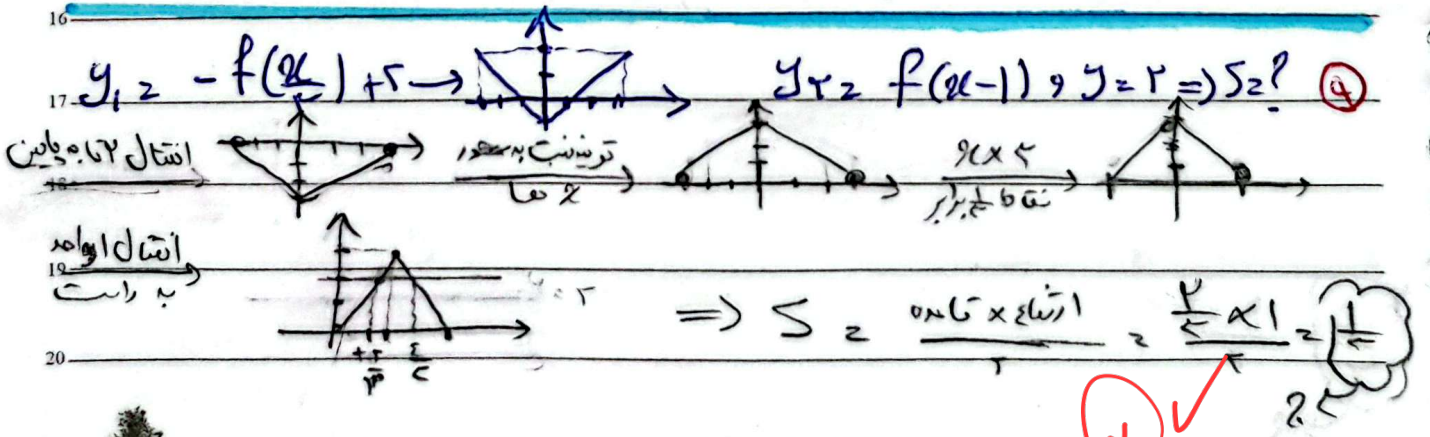
3 $x \geq \frac{3}{2} \rightarrow |2(x+k) - 3| + 1 \rightarrow |2(x+k) - 3| + 1 - 3$

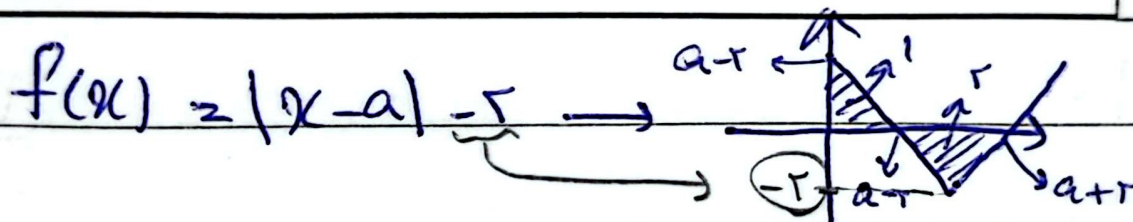
4 $g(x) = |2x + 2k - 3| - 2 \rightarrow g(0) = |2k - 3| - 2 = 4$

5 $k \geq \frac{3}{2} \rightarrow 2k - 3 - 2 = 4 \rightarrow k = \frac{9}{2}$
 6 $k < \frac{3}{2} \rightarrow 3 - 2k - 2 = 4 \rightarrow k = -\frac{3}{2}$
 7 $k = \frac{9}{2}$ (✓) (✓)

9 $f(x) = \frac{2x-1}{x+1}$ (مخرج را 1 می‌کنیم) $\frac{1-2x}{x+1}$ (مخرج را 1 می‌کنیم) $\frac{1-\frac{2}{x}}{\frac{1}{x}+1}$ (✓)
 10 $= \frac{1-2x}{x+1} \rightarrow \frac{1-2x}{x+1} + a = \frac{(2a+1) + (a-2)x}{x+1}$

12 $\frac{2x-1}{x+1} = \frac{(2a+1) + (a-2)x}{x+1} \rightarrow 2x^2 + 2x - 1 = (a-2)x^2 + (2a+1)x$
 13 $(a-2)x^2 + (2a+1)x - 1 = 0$ چون $\Delta = 0$ باشد $\Delta = 0$ در Δ می‌نویسیم
 14 $a-2=0 \rightarrow a=2$ (✓) این معادله در Δ نمی‌تواند باشد $\leftarrow$ نام درجه اول است $\leftarrow$
 15 $a=2$ (✓) $\rightarrow$ نقطه $(-\frac{1}{2}, -1)$ است $\rightarrow$ استخوان کرد $\rightarrow$ برقرار نیست (✓)





$$S_1 = \frac{(a-r) \times (a-r)}{r} = \frac{a^2 - 2ar + r^2}{r} = \frac{a^2}{r} - 2a + r$$

$$S_2 = \frac{r \times (a+r - a+r)}{r} = 2r$$

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

$$\rightarrow (a-r)^2 = 1 \rightarrow a-r = 1 \rightarrow a = 2$$

$$\rightarrow a-r = -1 \rightarrow a = 1 \rightarrow a-r = -1 \rightarrow$$

$$f\left(\frac{1}{r}\right) = \left|\frac{1}{r} - 2\right| - r = \frac{1}{r} - 2 - r = \left(\frac{1}{r} - 2 - r\right)$$