

الف:  $f(x), D_f = [-2, 5]$

ب:  $f(2x-2), D_f = ?$

$-2 \leq 2x-2 \leq 5$

$-2 \leq 2x \leq 7$

$-\frac{2}{2} \leq x \leq \frac{7}{2}$

$\hookrightarrow D_f = [-1, \frac{7}{2}]$  ✓

الف:  $f(2x-2), D_f = [-2, -1]$

ب:  $f(x), D_f = ?$

$-2 \leq x \leq -1$

$-12 \leq 2x \leq -6$

$-12 \leq 2x-2 \leq -6$

$\hookrightarrow D_f = [-12, -6]$  ✓

دو خط به راست  $\rightarrow x-2 \Rightarrow f(x) = (x-2) + \sqrt{(x-2)-2}$

تغییر متغیر  $\rightarrow y = (x-2) + \sqrt{x-4}$

$x = y$

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

(نیمساز نصف اول)  $x = y$

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

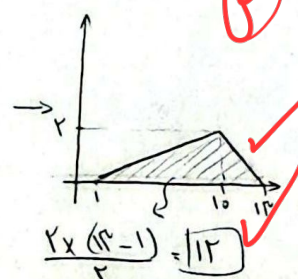
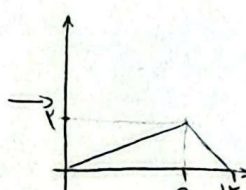
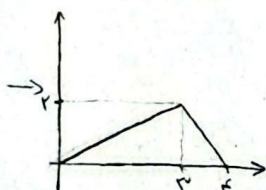
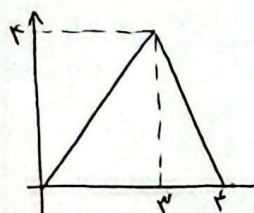
$\sqrt{y-4} = 2 \rightarrow y-4 = 4 \rightarrow y = 8$  ✓

$g(x) = 2f(2x+1)$

$g(x) = f(2x+1)$

$g(x) = f(x+1)$

$g(x) = f(x)$  ✓



$f(x) = -x$

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

$\frac{x-a}{2} = 2 \Rightarrow x-a = 4$

$\frac{2x-1-a}{2} = -2 \Rightarrow 2x-a = 3$

$x = -2$   
 $a = -9$  ✓

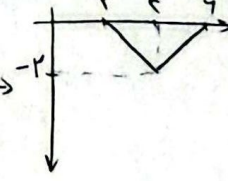
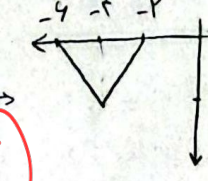
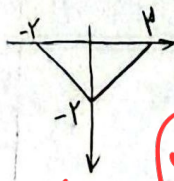
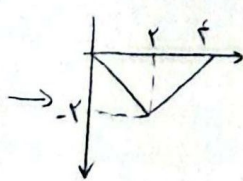
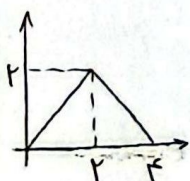
$y = -f(x-2)$

$y = f(x-2)$

$y = f(x)$

$y = f(x+2)$

$y = f(-x+2)$



$\Rightarrow y = \frac{1}{2}f(-x+2)$  ✓



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

$y = \sqrt{-(x+2)f(2x-1)}$   
 $\hookrightarrow x = -2 \hookrightarrow x = 0, 3, 4, 5$

|           |      |     |     |     |     |
|-----------|------|-----|-----|-----|-----|
| $x$       | $-2$ | $0$ | $3$ | $4$ | $5$ |
| $f(x-1)$  | $-$  | $+$ | $+$ | $+$ | $+$ |
| $f(2x-1)$ | $-$  | $+$ | $+$ | $+$ | $+$ |
| $y$       | $-$  | $+$ | $+$ | $+$ | $+$ |

$\Rightarrow D = [-2, 0] \cup [3, 5]$

$f(x) = |2x-3|+1 \xrightarrow{\text{معمولی}} y = |2(x+k)-3|+1 \xrightarrow{\text{معمولی}} y = |2(x+k)-3|+1-5$   
 $\hookrightarrow g(x) = |2x+2k-3|-2$

محل برخوردی  
 معادله  $\Rightarrow (0, y) \Rightarrow \frac{2}{3} + 1 = |2k-3|-2 \Rightarrow 2k-3 = 9 \Rightarrow 2k = 12 \Rightarrow k = 6, d$   $\checkmark$   
 $2k-3 = -9 \Rightarrow 2k = -6 \Rightarrow k = -3, d$   $\checkmark$

$f(x) = \frac{2x-1}{x+1} \xrightarrow{\text{تقسیم}} f(x) = \frac{-(x-1)}{x+1} \xrightarrow{\text{تقسیم}} \frac{-(\frac{1}{2}x-1)}{\frac{2}{2}x+1} = \frac{1-\frac{1}{2}x}{x+1} = \frac{2-2x}{2x+2}$   
 $\Rightarrow g(x) = \frac{2-2x}{2x+2} + k$

$\Rightarrow k = 1$   $\checkmark$   
 محض این  $g(x)$  باید برابر با  $f(x)$  باشد  
 معادله این  $f(x)$  باشد زیرا انتقال معادله است  
 تعداد نقاط برخورد یک!

$y_1 = -f(\frac{x}{2}) + 2$ 
 $y = -f(\frac{x}{2})$ 
 $y = f(\frac{x}{2})$ 
 $y = f(x)$ 
 $y = f(x-1)$

$\Rightarrow 1 \times (\frac{2}{2} - \frac{2}{2}) \times \frac{1}{2} = \frac{1}{2}$

$f(x) = |x-a| - 2$  (انتقال افقی)

$S = \frac{(a-2)(a-2)}{2} + \frac{(a+2)(a+2)}{2} = 9$   
 $\Rightarrow \frac{(a-2)(a-2)}{2} = \frac{1}{2} \Rightarrow (a-2)^2 = 1$   
 $a-2 = 1 \rightarrow a = 3 \checkmark$   
 $a-2 = -1 \rightarrow a = 1 \rightarrow a-2 = -1 < 0$  (مطلوب نیست)

$f(\frac{1}{2}) = |\frac{1}{2} - 3| - 2 = \frac{5}{2} - 2 = \frac{1}{2}$   $\checkmark$