

الف) $-4 \leq 3x-2 \leq 2 \rightarrow -2 \leq 3x \leq 4 \rightarrow -\frac{2}{3} \leq x \leq \frac{4}{3}$ $D_{f(3x-2)} = \left[-\frac{2}{3}, \frac{4}{3}\right]$

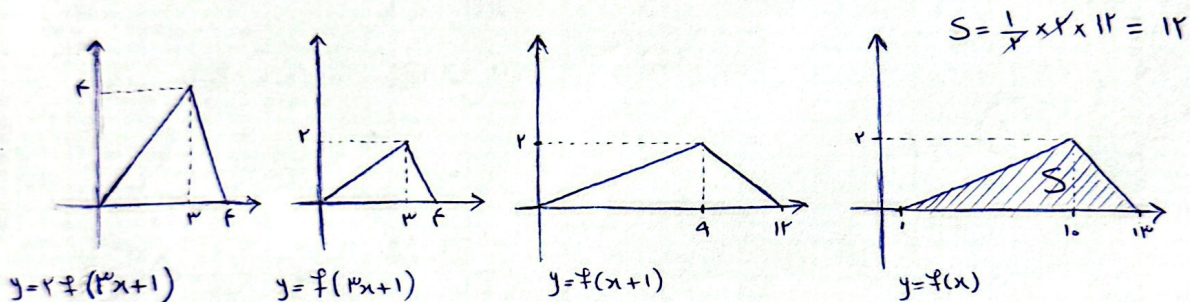
ب) $-4 \leq x \leq -2 \rightarrow -12 \leq 3x \leq -4 \rightarrow -14 \leq 3x-2 \leq -8$ $D_{f(x)} = [-14, -8]$

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$f(x) = x + \sqrt{x-2} \rightarrow f(x-2) = x-2 + \sqrt{x-2}$ $\xrightarrow{\text{معکوس}} x = y-2 + \sqrt{y-2}$

$\xrightarrow{\text{جایگزینی متغیر}} \text{نویسند}$
 $x = y$
 $y = y-2 + \sqrt{y-2} \rightarrow y = 8$

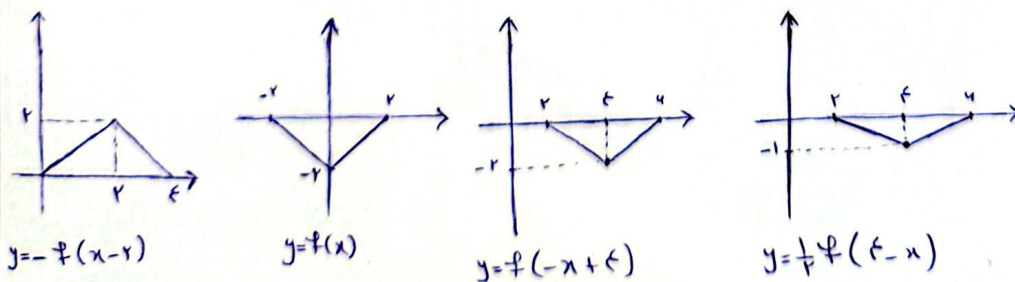
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$f(r) = -3 \rightarrow f\left(\frac{x-a}{r}\right) = f(r) \Rightarrow x = a + r$ $a + r f\left(\frac{x-a}{r}\right) = rx - 1$
 $a + r f(r) = rx - 1 \rightarrow a + (-4) = rx - 1$
 $a = -4$

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ابتدا شکل تابع $y = f(3x-1)$ را به کمک انتقال رسم می‌کنیم: $y = f(x)$ $y = f(x-1)$ $y = f(3x-1)$ $\Rightarrow -(x+2)f(3x-1) \geq 0$ $\begin{matrix} -2 & 0 & 1 & 13 \\ - & + & - & + \end{matrix}$ $D = [-2, 0] \cup [1, 13]$	6
$g(x) = r(x+k) - 3 + 1 - 3 \Rightarrow g(x) = rx + rk - 3 - 2$ $f(x) = rx - 3 + 1$ $\left. \begin{matrix} g(0) = rk - 3 - 2 \\ f(0) = 1 \end{matrix} \right\} \xrightarrow{x=0} \Rightarrow$ $\Rightarrow f(0) = g(0) \quad rk - 3 - 2 = 1 \rightarrow rk - 3 = 4 \rightarrow rk - 3 = \pm 4$ $k = 8, 0$ ✓ $k = -1, 0$ $(k > 0 \text{ و } 0 \text{ است})$	7
$(x, f(x)) \rightarrow (x, -f(x)) \rightarrow (x, -3f(x)) \Rightarrow f(3x) = -3f(x) + t \rightarrow t = \frac{4x-1}{3x+1} + \frac{4x-3}{x+1}$ $\rightarrow (4t-3t)x^2 + (t-2t)x + (-2-t) = 0 \Rightarrow \Delta > 0 \Rightarrow$ $4t-3t = 0 \Rightarrow t = 8$ برای اینکه این معادله یک ریشه داشته باشد ضریب x^2 باید صفر باشد.	8
$y = -f(\frac{x}{r}) + r$ $y = f(\frac{x}{r})$ $y = f(x)$ $y = f(x-1)$ $S = \frac{1}{r} \times 1 \times \frac{r}{r} = \frac{1}{r}$	9
$S_1 + S_2 = \frac{9}{r}$ $(\frac{1}{r}(a-r)^2) + (\frac{1}{r} \times r \times r) = \frac{9}{r}$ $(a-r)^2 = 1 \quad a-r = \pm 1$ $a = 1$ ✓ $a = 1$ $\Rightarrow (a-r > 0)$ $f(\frac{1}{a}) = f(\frac{1}{r})$ $\Rightarrow \frac{1}{r} - 3 - 2 = \frac{r}{r}$ $f(x) = x-a - r \rightarrow f(x) = x-3 - 2$	10