

الف) $D_f = [-4, 2]$ $-4 \leq 3x - 2 \leq 2 \rightarrow -2 \leq 3x \leq 4 \rightarrow -\frac{2}{3} \leq x \leq \frac{4}{3}$ 19

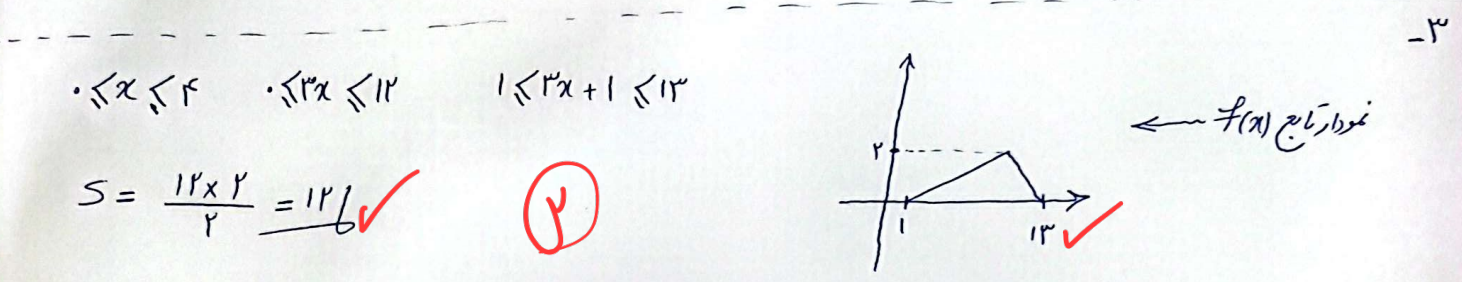
ب) $-4 \leq x \leq -2$ $-12 \leq 3x \leq -6 \rightarrow -14 \leq 3x - 2 \leq -8$ $D_f = [-14, -8]$ 20

معادله معکوس تابع است که نیاز به معادله معکوس آن نیست زیرا $f(x)$ و $f^{-1}(x)$ همواره در یک نقطه مشترک خط $y=x$ قطع می کنند

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

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

$x - 4 = 4$ $x = 8$ $y = 8$ 21



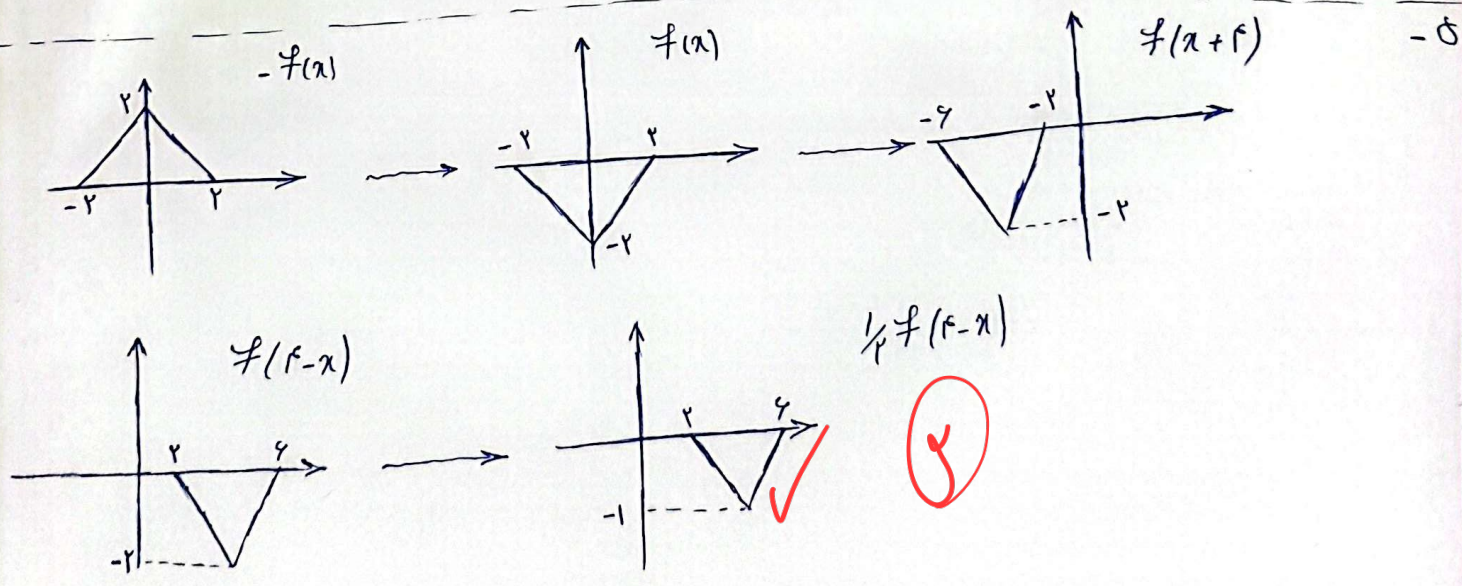
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$A(1, -3) \rightarrow y = f(x) \rightarrow f(1) = -3$

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

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

$\begin{cases} 2x - a = 2 \\ x - a = 2 \end{cases} \Rightarrow a = -2$ 23



$$-(x+2)f(3x-1) \geq 0 \quad (x+2)f(3x-1) \leq 0$$

$$3x-1=0 \rightarrow x=1/3$$

$$3x-1=2 \rightarrow x=1$$

$$3x-1=-1 \rightarrow x=0$$

	-2	0	1	2
$x+2$	-	+	+	+
$3x-1$	-	-	+	-
$f(3x-1)$	+	-	+	-

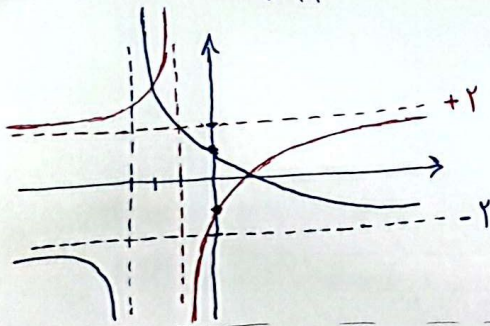
$$D_f = [-2, 0] \cup [1, 2]$$

$$\text{نقطه بحر} = y$$

$$|2(x+k)-3|+1-3 = |2x+2k-3|-2$$

$$|2k-3|-2 = |-3|+1 \rightarrow |2k-3|=6 \rightarrow 2k-3=6 \quad 2k=9 \quad k=4.5$$

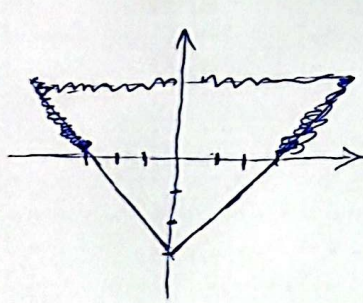
$$\frac{2x-1}{x+1} \xrightarrow{\text{تقریب نسبت به طول}} \frac{1-2x}{x+1} \xrightarrow{\text{طول نقاط برابر}} \frac{1-\frac{2x}{3}}{\frac{x}{3}+1} = \frac{3-2x}{x+3}$$



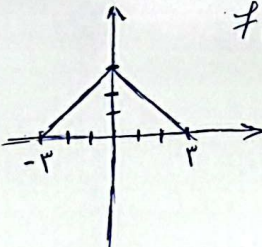
اگر نمودار را واحد به سمت بالا بریم تنها یک نقطه مشترک خواهد داشت

$$\begin{aligned} \text{آبی} &\rightarrow \frac{3-2x}{x+3} \\ \text{قرمز} &\rightarrow \frac{2x-1}{x+1} \end{aligned}$$

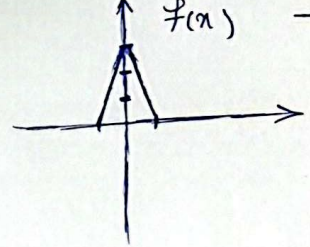
$$K=4$$



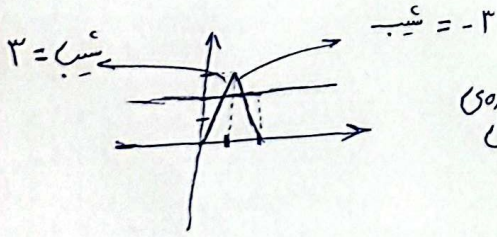
$$-f(x_4)$$



$$f(x_3)$$

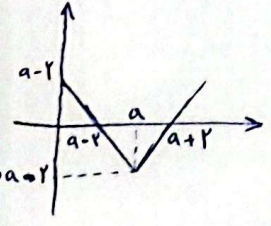


$$-9$$



$$\frac{1}{3} + \frac{1}{3} = \frac{2}{3}$$

$$S = \frac{2}{3} \times 1 \times \frac{1}{4} = \frac{1}{6}$$



$$\frac{q}{r} = \frac{(a-2)^2}{r} + \frac{f(a-2)}{r}$$

$$q = a^2 - 4a + 4 + f(a-2) - 8$$

$$a^2 - 13 = 0 \quad a = \sqrt{13}$$

$$\frac{1}{\sqrt{13}} = \frac{\sqrt{13}}{13}$$

$$f\left(\frac{\sqrt{13}}{13}\right) = \left|\frac{\sqrt{13}}{13} - \frac{13\sqrt{13}}{13}\right| - 2 = \frac{12\sqrt{13}}{13} - 2$$

$$a=3$$

$$f\left(\frac{1}{3}\right) = \frac{2}{3}$$