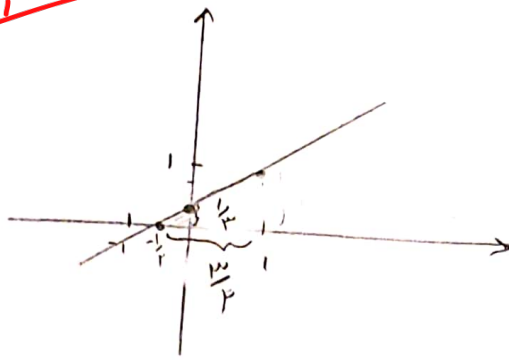
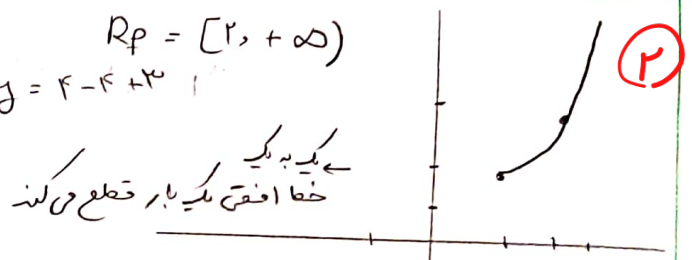


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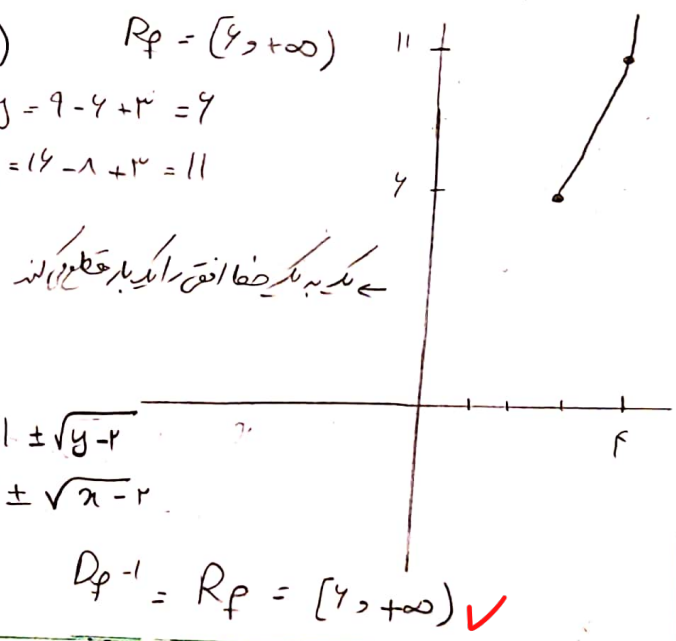
$y = 3x - 1 \rightarrow f(x) \rightarrow y + 1 = 3x \rightarrow x = \frac{y+1}{3} \rightarrow f^{-1}(x) = \frac{y+1}{3}$
 $\frac{y+1}{3} \begin{cases} x=0 \rightarrow \frac{1}{3} \\ \frac{y+1}{3} = 0 \rightarrow y+1=0 \rightarrow y=-1 \\ x=1 \rightarrow y=2 \end{cases}$
 $S = \frac{1}{3} \times \frac{1}{3} = \frac{1}{9} \checkmark$

الف) $y = x^2 - 2x + 3, x \in [1, +\infty)$ $R_f = [2, +\infty)$
 $x_s = \frac{y}{x} = 1, y_s = 1 - 2 + 3 = 2 \mid x=2, y=4 - 4 + 3 = 3$
 $\Delta = 4 - f(1)(3) < 0 \rightarrow$ ندارد



$y = x^2 - 2x + 3 \rightarrow x^2 - 2x + 1 = y - 2 \rightarrow (x-1)^2 = y-2 \rightarrow x-1 = \pm \sqrt{y-2} \rightarrow x = 1 \pm \sqrt{y-2}$
 $\checkmark 1 + \sqrt{y-2} = y \leftarrow \text{قبول} \oplus \leftarrow y = 1 \pm \sqrt{x-2} \leftarrow D_{f^{-1}} = R_f = [2, +\infty) \checkmark$

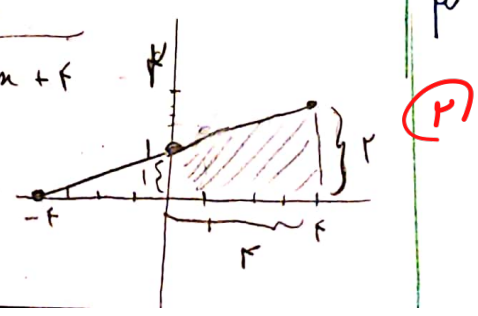
ب) $y = x^2 - 2x + 3, x \in [3, +\infty)$ $R_f = [4, +\infty)$
 $x_s = \frac{y}{x} = 1, y_s = 1 - 2 + 3 = 2 \mid x=3, y=9 - 6 + 3 = 6$
 $\Delta = 4 - f(1)(3) < 0 \rightarrow$ ندارد $x=4, y=16 - 8 + 3 = 11$



$y = x^2 - 2x + 3 \rightarrow x^2 - 2x + 1 = y - 2 \rightarrow (x-1)^2 = y-2 \rightarrow x-1 = \pm \sqrt{y-2} \rightarrow x = 1 \pm \sqrt{y-2}$
 $\checkmark y = 1 + \sqrt{x-2} \leftarrow \text{قبول} \oplus \leftarrow y = 1 \pm \sqrt{x-2} \leftarrow D_{f^{-1}} = R_f = [4, +\infty) \checkmark$

$f(x) = 2x - \sqrt{14 - 4x(4-x)} \rightarrow 2x - |2x - 4| = f(x)$
 $14 - 4x(4-x) = 14 - 16x + 4x^2$
 $S = \frac{(x+1) \times 4}{2} = 4 \checkmark$

$f(x) = 2x - 4 = y \rightarrow R_f = (-\infty, 2]$ $R_f = (-\infty, 2]$
 $f(x) = y + 4 \rightarrow x = \frac{y+4}{2}$
 $D_{f^{-1}} = (-\infty, 2], f^{-1}(x) = \frac{x+4}{2} \rightarrow x=0 \rightarrow y=4, x=2 \rightarrow y=2$

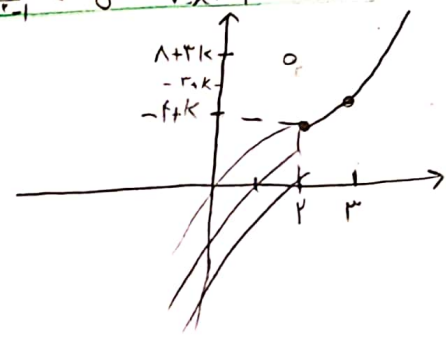


$$y = \frac{x}{\sqrt{x^2 - a}} \rightarrow \text{مشتق } y' = \frac{x}{x^2 - a} \quad \text{if } \begin{cases} (x_1, y) \in f \\ (x_2, y) \in f \end{cases} \rightarrow \frac{x_1}{\sqrt{x_1^2 - a}} = \frac{x_2}{\sqrt{x_2^2 - a}} \rightarrow \frac{x_1^2}{x_1^2 - a} = \frac{x_2^2}{x_2^2 - a}$$

$$x^2 > a \rightarrow \begin{cases} x > a \\ x < -a \end{cases}$$

$$y = \frac{x}{\sqrt{x^2 - a}} \rightarrow x = \frac{y}{\sqrt{y^2 - a}} \rightarrow x^2 = \frac{y^2}{y^2 - a} \rightarrow x^2 y^2 - a x^2 = y^2 \rightarrow x^2 y^2 - y^2 = a x^2 \rightarrow y^2(x^2 - 1) = a x^2 \rightarrow y^2 = \frac{a x^2}{x^2 - 1} \rightarrow y = \pm \sqrt{\frac{a x^2}{x^2 - 1}}$$

$$g(x) = \begin{cases} x^2 - 4x + 4 & ; x > 2 \\ -x^2 + 4x + 3 & ; x < 2 \end{cases}$$



$$1 + 3k \leq -4 + k \rightarrow 2k \leq -5 \rightarrow k \leq -2.5$$

$$ab = \frac{a}{b} \rightarrow ab = \frac{a}{b}$$

$$g(x) = ax + b|x|$$

$$f(x) = 3x + |x|$$

$$\frac{(a-b)x}{(a+b)x}$$

$$f^{-1}(x) = \frac{x}{4} \leftarrow x = y \mid f(x) = y \rightarrow f^{-1}(x) = \frac{x}{4}$$

$$\begin{aligned} a+b &= \frac{1}{4} \\ a-b &= \frac{1}{4} \end{aligned}$$

$$2a = \frac{1}{2} \rightarrow a = \frac{1}{4}, b = \frac{1}{4}$$

$$y = f \circ f^{-1}(x) + f^{-1}(x) \quad f(x) = \frac{3x+4}{x+1} \rightarrow f^{-1}(x) = \frac{x}{4}$$

$$x = x + f^{-1}(x)$$

$$f(x) = \frac{3x+4}{x+1} \rightarrow -1 = \frac{y+4}{y+1} \rightarrow -1(y+1) = y+4 \rightarrow -y-1 = y+4 \rightarrow -2y = 5 \rightarrow y = -2.5$$

$$f^{-1}(x) = 0 \rightarrow f(0) = 4 \rightarrow -\frac{x}{4} = 0 \rightarrow x = 0$$

نیاز
نامی اول
درسم

$$\Rightarrow y = x$$

مشتق g, f

$$f\left(\frac{3x+4}{x+1}\right) = 1 - g\left(\frac{x}{4}\right) = -x$$

$$f(g^{-1}(x)) + f^{-1}(-x)$$

$$f(a) = -x \rightarrow f^{-1}(-x) = a$$

$$g(b) = x \rightarrow g^{-1}(x) = b$$

$$f(b) + a \Rightarrow f\left(\frac{x}{4}\right) - 2x + 3 = 1x - 2x + 3$$

$$y = \frac{\omega x - 13}{1 - x} \xrightarrow[\text{بمبدأ القسمة]{\text{قانون القسمة}}} -y = \frac{-\omega x - 13}{x + 1} \rightarrow y = \frac{\omega x + 13}{x + 1}$$

$$y = \frac{\omega(x-2) + 13}{(x-2) + 1} \rightarrow y = \frac{\omega x + 13}{x - 1} \rightarrow y = \frac{\omega x + 13}{x - 1} - 13$$

$$\rightarrow y = \frac{\omega x + 13 - 13x + 13}{x - 1} = \frac{13x + 4}{x - 1} = f(x)$$

$$y = \frac{13x + 4}{x - 1} \rightarrow x = \frac{13y + 4}{y - 1} \rightarrow y = -\frac{-x - 4}{x - 1} \rightarrow y = \frac{x + 4}{x - 1} = f^{-1}(x)$$

$$f(x) = f^{-1}(x) \quad \frac{13x + 4}{x - 1} = \frac{x + 4}{x - 1} \rightarrow x^2 - 13x - 4 = x^2 - 5x + 4 \rightarrow S = 3 \checkmark$$

$$f(x) = x + f[x]$$

قانون القسمة
(درون)

$$f(x) = x + f[x] \rightarrow y = x + f[x]$$

$$x = y + f[y]$$

$$x = y + f[y]$$

$$\rightarrow [x] = [y + f[y]]$$

$$[x] = [y] + f[y] = \omega[y]$$

$$[y] = \frac{[x]}{\omega} \rightarrow f[y] = \frac{f[x]}{\omega}$$

$$\text{ضرب} (f-g)(x) = f(x) - g(x) = x + f[x] - x + \frac{f[x]}{\omega} = \frac{13[x] + f[x]}{\omega} = \frac{13f[x]}{\omega} \checkmark$$

$$D_{f^{-1}} = R_f = \{x \mid x \in \mathbb{R}, [\omega x, \omega x + 1]\}$$