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تکلیف ۱۰

مهرداد ساعی

(۱

$2y = 3x - 1 \Rightarrow f^{-1}: 2x = 3y - 1 \Rightarrow y = \frac{2x+1}{3}$

$\Rightarrow x = 0 \Rightarrow y = \frac{1}{3}$

$y = 0 \Rightarrow x = -\frac{1}{2}$

$\frac{1}{2} \times \frac{1}{3} = \frac{1}{6} \div 2 = \frac{1}{12}$

(۲

الف) $y = x^2 - 2x + 3 \Rightarrow \frac{-b}{2a} = \frac{2}{2} = 1 \Rightarrow x \in [1, +\infty)$

یک به یک است

ب) $y = x^2 - 2x + 3 \Rightarrow x \in [2, +\infty) \Rightarrow$ یک به یک است

$f^{-1}(x): x = y^2 - 2y + 3 \Rightarrow x - 3 + 1 = y^2 - 2y + 1 \Rightarrow x - 2 = (y-1)^2$

$\Rightarrow y = \sqrt{x-2} + 1$

(۳

$y = 2x - \sqrt{4x^2 - 16x + 16} = 2x - 2|x-2|$

$\to x \geq 2 \to y = 4$

$\to x < 2 \to 4x - 4$ ✓

$\Rightarrow f^{-1}(x) \Rightarrow x = 4y - 4 \Rightarrow y = \frac{x+4}{4} \quad x \in (-\infty, 4]$

$\Rightarrow x = 4 \Rightarrow y = 2$

$\frac{x+4}{4} = 0 \Rightarrow x = -4$

$\Rightarrow \frac{3 \times 4}{2} = 6$

① $x_1 = x_2$

$\frac{x_1}{\sqrt{x_1^2-5}} = \frac{x_2}{\sqrt{x_2^2-5}} \to$ ② $x_1^2 = x_2^2 \Rightarrow x_1 = \pm x_2$ (۴

$\Rightarrow$ یک به یک است

۲ع ق ق

$\Rightarrow f^{-1}(x): x = \frac{y}{\sqrt{y^2-5}} \Rightarrow x^2 = \frac{y^2}{y^2-5} \Rightarrow y^2 = \frac{5x^2}{x^2-1}$

$\Rightarrow y = \sqrt{\frac{5x^2}{x^2-1}}$

$x=2 \Rightarrow -4, 6$; $x=2 \Rightarrow 3k, 5, 8$; $-4, 6 < 3k < 5, 8 \Rightarrow 2 < k \leq -12$ (۵

$\Rightarrow k = -6$

$f^{-1}(x) \begin{cases} x \geq 0 \to \frac{x}{4} \\ x < 0 \to \frac{x}{2} \end{cases} \Rightarrow \begin{array}{l} a+b = \frac{1}{4} \\ a-b = \frac{1}{2} \end{array}$ (۶

$\Rightarrow a = \frac{3}{8}\quad b = -\frac{1}{8} \Rightarrow ab = -\frac{3}{64}$

$m = -3 \Rightarrow y = \frac{3x+4}{x-3} \Rightarrow f^{-1}(x) = \frac{3x+4}{x-3}$ (۷

$\Rightarrow x + \frac{3x+4}{x-3} = x \Rightarrow \frac{3x+4}{x-3} = 0 \Rightarrow 3x+4 = 0 \Rightarrow x = -\frac{4}{3}$

$3-2x = t \Rightarrow \frac{t-3}{2} = -x$; $\frac{x}{2} = t \Rightarrow x = 2t$ (۸

$f^{-1}(4) = \frac{3-4}{2} \Rightarrow -\frac{1}{2}$

$f^{-1}(-2) = 2x \Rightarrow 2 \times -2 = -4$

$-4 - \frac{1}{2} = -4.5$

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$y=\frac{-5x+13}{x+1} \xrightarrow{\text{انتقال}} \frac{2x+4}{x-1} \Rightarrow f(x)=\frac{2x+4}{x-1}$ (9

$\Rightarrow f^{-1}(x)=\frac{x+4}{x-2} \Rightarrow \frac{x+4}{x-2}=\frac{2x+4}{x-1} \Longrightarrow$

$x^2+5x-4=2x^2+2x-12 \rightarrow -x^2+3x+8 \Rightarrow -\frac{b}{a}=3$

$f^{-1}(x)=g(x) \rightarrow f(x)=x+[x]$ (10

$\Rightarrow f^{-1}(x) \Rightarrow y=x-[y] \Rightarrow y=x-\frac{1}{2}[x]$

$\Rightarrow f-g=x+[x]-x+\frac{1}{2}[x]=\frac{3}{2}[x]$