

14, 17, 5

$$D_{g \circ f} = \{ x \in D_f \cap f(x) \in D_g \}$$

$$D_f = \frac{x-1}{x+1} > 0 \cap \log_r \frac{x-1}{x+1} \geq 0 \quad x-1 \geq 1 \quad x \geq 2 \Rightarrow D_f = [2, +\infty)$$

$$g(x, \sqrt{-(x^2 - 2x + 1)}) = \sqrt{-(x-1)^2} \geq 0 \Rightarrow -(x-1)^2 \geq 0 \Rightarrow D_g = \{1\}$$

$$\Rightarrow \sqrt{\log_r \frac{x-1}{x+1}} = 1 \quad || \log_r \frac{x-1}{x+1} || = 1 \Rightarrow x-1 = 14 \quad (x=15) \checkmark$$

در این مرحله $x-1 = \frac{1}{14} \quad x = \frac{15}{14}$ است

$$g \circ f(x) = (x^2 - 2x + 1)^2 - 2(x^2 - 2x + 1) + 1 = 4x^2 - 4x + 1 = g \circ f(x)$$

$$f \circ g(x) = 2(x^2 - 3x + 1) - 5 = 2x^2 - 6x + 14 - 5 = 2x^2 - 6x + 9$$

$$\Rightarrow g \circ f(x) = f \circ g(x) = 4x^2 - 4x + 1 = 2x^2 - 6x + 9$$

$$\Rightarrow 2x^2 - 4x + 3 = 0 \Rightarrow S = \frac{20}{2} = 10 \quad P = \frac{37}{2}$$

$$\Rightarrow x^2 + y^2 = S^2 - 2P = 100 - 37 = 63 \checkmark$$

$$g(x) = 5x^2 + 11 \Rightarrow 2x = t \quad x = \frac{t}{2}$$

$$\Rightarrow g(t) = \frac{5t^2}{4} + 11 \Rightarrow g(x) = \frac{5x^2}{4} + 11 \Rightarrow \frac{5(x-1)^2}{4} + 11$$

چون تابع زوج و همواره مثبت است پس کمترین مقدار تابع min تابع است که 2, 11 است پس

$$\hookrightarrow \frac{5(1-1)^2}{4} + 11 = 11 \checkmark$$

$$2g + 4 = 2x^2 - 6x - 1$$

$$2g = 2x^2 - 6x - 1 + 4$$

$$g = \frac{2x^2 - 6x + 3}{2} \quad g(x) = x^2 - 3x + 1$$

$$g \circ f(x) = (x^2 - 3x + 1)^2 - 2(x^2 - 3x + 1) + 1$$

$$g \circ f(x) = 4x^2 - 4x + 14 - 6x + 4 + 1 = 4x^2 - 10x + 19$$

$$4x^2 - 10x + 19 = g \circ f(x)$$

✓

$$\text{طبق سوال} \Rightarrow f(u) - g(u) = 0 \Rightarrow f(u) = g(u)$$

$$\Rightarrow 2g(u) = 3f(u) - 14 \Rightarrow 2g(u) = 3g(u) - 14 \Rightarrow \underline{g(u) = 14}$$

$$f(0) - g(0) = 0 \Rightarrow f(0) = 0 + g(0)$$

$$\Rightarrow 2g(0) = 3(0 + g(0)) - 14 \Rightarrow 2g(0) = 14 + 3g(0) - 14 \Rightarrow g(0) = -1$$

$$\Rightarrow (g(x)) = \left\{ \begin{matrix} (x, 14) \\ (0, -1) \end{matrix} \right\} \Rightarrow \left. \begin{matrix} \text{چون } x=2 \text{ نماند} \\ \text{است پس } x=2 \text{ نماند} \end{matrix} \right\} \Rightarrow ax + b = g(x)$$

$$\underline{3x - 1 = g(x)}$$

$$\Rightarrow \frac{(14+1)}{0-1} = \textcircled{3}$$

$$\Rightarrow 2g(x) = 2f(x) - 14 = 2(3x - 1) = 3f(x) - 14$$

$$\Rightarrow 6x - 2 = 3f(x) - 14$$

$$\Rightarrow 2(3x - 1) + 12 = f(x) \quad \frac{4x + 12}{3} = 3x + 4 = f(x)$$

$$4x + 12 = 0 \quad 4x = -12 \Rightarrow x = -\frac{3}{1}$$

$$\Rightarrow \underline{x = -\frac{3}{1}} \checkmark$$

$$f \circ g(x) = 9^{\log_3 x} \Rightarrow x^{\frac{\log_3 9}{\log_3 3}} = x^2 = f \circ g(x)$$

$$g \circ f(x) = \log_3 9^x = x \log_3 9 = 2x = g \circ f(x)$$

$$\Rightarrow x^2 \leq 2x$$



$$\Rightarrow x^2 = 2x$$

$$\textcircled{x = 2}$$

$$\textcircled{x = 0}$$

طبق شکل نمودار $x^2 \leq 2x$ در بازه

$\{x \in \mathbb{R} \mid 0 \leq x \leq 2\}$ برابر و بزرگتر از 0 است

