

$$f(x) = \sqrt{\log_r(x-1)}$$

$$g(x) = \sqrt{-x^2 + 12x - 5}$$

$$D_{g \circ f}(x)$$

$$D_f = \log_r(x-1) \geq 0 \rightarrow (x-1) \geq 1 \rightarrow x \geq 2 \quad (1)$$

$$x-1 > 0 \rightarrow x > 1 \quad (2)$$

$$1 < 2 \rightarrow x > 2$$

$$D_{g \circ f} = (1) \cap (2) = \{x \mid x > 2\}$$

$$D_g = -x^2 + 12x - 5 \geq 0$$

$$-(x-2)^2 \geq 0 \rightarrow (x-2)^2 \leq 0 \rightarrow x=2$$

$$D_{g \circ f} = \{x \mid x \in D_{f(x)}; f(x) \in D_{g(x)}\}$$

$$\sqrt{\log_r(x-1)} = 2 \rightarrow \log_r(x-1) = 4$$

$$f(x) = 2x - 5$$

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

$$f \circ g(x) = g \circ f(x)$$

$$f(g(x)) = 2(x^2 - 4x + 1) - 5 = 2x^2 - 8x + 2 - 5 = 2x^2 - 8x - 3$$

$$g(f(x)) = (2x - 5)^2 - 4(2x - 5) + 1 = 4x^2 - 20x + 25 - 8x + 20 + 1 = 4x^2 - 28x + 46$$

$$2x^2 - 8x - 3 = 4x^2 - 28x + 46$$

$$0 = 2x^2 - 20x + 49 \rightarrow x = \frac{20 \pm \sqrt{400 - 392}}{4} = \frac{20 \pm \sqrt{8}}{4} = \frac{20 \pm 2\sqrt{2}}{4} = \frac{10 \pm \sqrt{2}}{2}$$

$$g \circ f(x) = 5x^2 + 11$$

$$f(x) = 2x$$

$$g(x-v) = ?$$

$$g(2x) = 5x^2 + 11 \rightarrow g(t) = 5\left(\frac{t}{2}\right)^2 + 11 = \frac{5t^2}{4} + 11$$

$$2x = t \rightarrow x = \frac{t}{2}$$

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

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

$$\min g(x-v) = 11$$

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

$$f(x) = 2x - 1$$

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

$$g \circ f(x) = ?$$

$$f(g(x)) =$$

$$2g(x) - 1 = 2(x^2 - 4x + 1) - 1 = 2x^2 - 8x + 2 - 1 = 2x^2 - 8x + 1$$

$$g \circ f(x) \Rightarrow (2x - 1)^2 - 4(2x - 1) + 1 = 4x^2 - 4x + 1 - 8x + 4 + 1 = 4x^2 - 12x + 6$$

$$g \circ f(x) = 4x^2 - 12x + 6$$

$$f(g(x)) = 2g(x) - 1$$

$$f(x) = ax + b$$

$$g(x) = cx + d$$

$$f(g(x)) = a(cx + d) + b = (ac)x + (ad + b)$$

$$f(g(x)) = (a-c)x + b - d = -x + 5$$

$$2cx + d = 2ax + 2b - 1$$

$$a - c = -1$$

$$2c = 2a$$

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

$$c = \frac{1}{2}a$$

$$-1 = -1$$

$$\rightarrow f(x) = 2x + 1$$

$$\rightarrow g(x) = 2x - 1$$

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

وقت تلفی - ریاضت - کثیف

$$f(x) = 9^x$$

$$g(x) = 1 \cdot 9^x$$

$$f \circ g(x) = f(1 \cdot 9^x) = 9^{1 \cdot 9^x} = 9^{9^x} = x^{1 \cdot 9^x} = x^9$$

$$g \circ f(x) = 1 \cdot 9^{9^x} = 1 \cdot 9^{9^x} = 9^x$$

$$f \circ g(x) \leq g \circ f(x)$$

تفاوت صغیر و بزرگ

$$1 + \frac{1}{x} - \frac{1}{x} +$$

$$x^2 \leq 2x$$

$$x^2 - 2x \leq 0$$

$$x(x-2) \leq 0 \rightarrow \text{جواب صحیح 0 و 2}$$

$$f(x)$$

$$f\left(x - \frac{1}{x}\right) = x^2 + x - 1 - \frac{1}{x} + \frac{1}{x^2}$$

$$f\left(x - \frac{1}{x}\right) = \left(x - \frac{1}{x}\right)^2 + x - \frac{1}{x}$$

$$f(t) = t^2 + t$$

$$f(x) = x^2 + x$$

$$A \rightarrow D_{f \circ g}$$

$$B \rightarrow R_{f \circ g}$$

$$A \cap B = \emptyset$$

$$(0, 1) \cap (-\infty, 1] = (0, 1] \checkmark$$

$$A = \left\{ x \mid x \in D_g; g(x) \in D_f \right\} \rightarrow (0, 1)$$

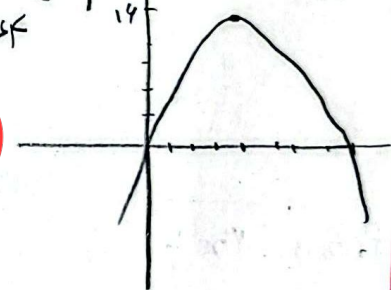
$$1 - x^2 > 0$$

$$B = \text{ضریب } f \rightarrow \text{ضریب } f \rightarrow (-\infty, 1]$$

$$R_g = (-\infty, 1]$$

$$g(x) = 1 - x^2$$

$$f(x) = \log x$$



$$h(x) = x^3 + 2x + 1$$

$$g(x) = x - 1$$

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

$$f(f(x)) = 1 - 3f^2(x)$$

$$h(g(x)) = f(x)$$

$$(x-1)^3 + 2(x-1) + 1 = x^3 - 3x^2 + 3x - 1 + 2x - 2 + 1 = x^3 - 3x^2 + 5x - 2$$

$$x^3 - 3x^2 + 5x - 2 = 1 - 3x^2 \rightarrow x^3 + 5x - 3 = 0 \rightarrow \Delta y' < 0$$

$$g(3) = 1$$

$$g \circ f(x) = ax^2 + bx$$

$$f(x) = x - \frac{1}{x}$$

$$f(x) = 3 \leftarrow g(f(x)) = ax^2 + bx$$

$$g(3) = 1$$

$$f(x) = 3 = x - \frac{1}{x}$$

$$3x = x^2 - 1$$

$$x^2 - 3x - 1 = 0$$

$$x = 1$$

$$ax^2 + bx = 1$$

$$x=1 \rightarrow 14a + 1 = 1 \rightarrow a = 0$$

$$x=-1 \rightarrow -14a - 1 = 1 \rightarrow a = -1$$