

$$\left(\frac{y}{x}\right) = \frac{y}{x} = \frac{1}{y} \quad \cot \frac{\pi}{6} = \cot \frac{\pi}{6} = \sqrt{3} \Rightarrow \sqrt{\sqrt{3}^2 + 1} = 2 \checkmark \quad 19$$

$$\frac{y}{x} = \frac{1}{y} \Rightarrow f\left(\frac{1}{y}\right) \Rightarrow x = y \rightarrow \sqrt{\frac{y(y)-1}{y^2}} = \sqrt{\frac{y^2}{y^2}} \checkmark$$

$$\frac{\sqrt{y}}{1-\sqrt{y}} \Rightarrow f\left(\frac{\sqrt{y}}{1-\sqrt{y}}\right) = \left[\frac{\sqrt{y}}{1-\sqrt{y}}\right] = -1 \checkmark$$

$$f\left(\frac{y}{x}\right) = \sin \frac{\pi}{6} = \frac{\sqrt{2}}{2} \Rightarrow g\left(\frac{\sqrt{2}}{2}\right) = \frac{\sqrt{2}}{2} \sqrt{1 - \left(\frac{\sqrt{2}}{2}\right)^2} = \frac{\sqrt{2}}{2} \times \sqrt{\frac{1}{2}} = \frac{\sqrt{2}}{2} \times \frac{1}{\sqrt{2}} = \frac{1}{2} \checkmark$$

$$\text{الف) } \{(1, 5), (2, 5), (2, 12), (1, 12)\} \checkmark \quad \text{ب) } \{0\} \checkmark \quad \text{ج) } \{0\} \checkmark \quad \text{د) } \{(1, 1), (2, 2), (3, 3)\} \checkmark$$

$$f \circ g = \{(1, 1), (2, 2), (3, 3)\} \quad a = 1 \checkmark$$

$$g \circ f = \{(1, 1), (2, 2)\} \quad b = 2 \checkmark$$

$$\left. \begin{array}{l} a = 1 \checkmark \\ b = 2 \checkmark \end{array} \right\} (1, 2) \checkmark$$

در صورت کلی بر الی خطی بدون تابع  $f$  پس تابع کلی آن یکی از دو حالت زیر است:

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

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

$$g(-1) \Rightarrow 2x + 2 = -1 \rightarrow 2(-2) - 2 = -6 \checkmark$$

$$x + |x| \geq 0 \quad \begin{cases} x \geq 0 \rightarrow x + |x| = 2x \geq 0 \quad \checkmark \checkmark \checkmark \\ x < 0 \rightarrow x + |x| = x - x = 0 \quad (-\infty, \infty) \end{cases} \rightarrow f(x) = \begin{cases} \sqrt{2x}, & x \geq 0 \\ [x+1], & x < 0 \end{cases} [0, \infty)$$

$$f(x) = 0 \rightarrow x \leq 0$$

$$f(x) = f \rightarrow x = 1 \rightarrow \sqrt{2x} = f \rightarrow 2x = 4 - x = 3$$

$$D(g \circ f) = (0, \infty) \setminus \{1\} = (0, 1) \cup (1, \infty) \checkmark$$

$$1 - x^2 \geq 0 \rightarrow -1 \leq x \leq 1 \rightarrow f(x) = \sqrt{1 - x^2} \Rightarrow 0 \leq f(x) \leq 1$$

$$(f \circ g)(y) = f(g(y)) = \sqrt{1 - y^2} + \sqrt{y}$$

$$\|(f \circ g) \circ f\|(x) = \sqrt{1 - (f(x))^2} + \sqrt{f(x)} = \sqrt{1 - (1 - x^2)} + \sqrt{1 - x^2}$$

$$x \in [-1, 1] \checkmark$$

$(f+g) \circ f \Rightarrow f(f(x))$  و  $g(f(x)) \Rightarrow g(f(x)) \rightarrow f(x) \geq 0$

$f(x) \in [0, 1]$

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