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1. VQ

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$$1) y = \sqrt{x-2} \rightarrow y_1 = y_2 \rightarrow \sqrt{x_1-2} = \sqrt{x_2-2} \Rightarrow x_1 = x_2 \rightarrow \text{یک به یک است} \checkmark$$

$$\rightarrow x = \sqrt{y+2} \rightarrow x^2 = y+2 \rightarrow y = x^2 - 2 \checkmark$$

(2)

$$2) y = x^2 - 5x + 3 \rightarrow (n-2)(n-1) \rightarrow \text{یک به یک است} \checkmark$$

$$\rightarrow y = x^2 - 5x + 3 \rightarrow y = (x-2)^2 - 1 \rightarrow n(y-1) - 1 \rightarrow y = \sqrt{n+1} \checkmark$$

$$f(x) = y = x + \sqrt{x} \rightarrow (y-x)^2 = x \rightarrow y^2 - 2xy + x^2 = x \rightarrow y^2 - 2xy + x^2 - x = 0$$

$$\rightarrow x^2 - x(2y+1) + y^2 = 0 \rightarrow \Delta = (2y+1)^2 - 4y^2 = 4y+1$$

$$\rightarrow x = \frac{2y+1 \pm \sqrt{4y+1}}{2} \quad f^{-1}(y) = y = \frac{2x+1 \pm \sqrt{4x+1}}{2} = x + \frac{1}{2} \pm \sqrt{x}$$

$$\text{در دو صورت } x + \frac{1}{2} - \sqrt{x} = x + \frac{1}{2} - \sqrt{x+1} \Rightarrow x + \frac{1}{2} - \sqrt{x+1} = x + \frac{1}{2} - \sqrt{x} \Rightarrow \sqrt{x+1} = \sqrt{x} \Rightarrow x = -\frac{1}{4}$$

$$y = \frac{x}{\sqrt{x^2-2}} \rightarrow y_1 = y_2 \rightarrow \frac{x_1}{\sqrt{x_1^2-2}} = \frac{x_2}{\sqrt{x_2^2-2}} \rightarrow \frac{x_1^2}{x_1^2-2} = \frac{x_2^2}{x_2^2-2}$$

$$\rightarrow \frac{x_1^2}{x_1^2-2} = \frac{x_2^2}{x_2^2-2} \Rightarrow x_1^2(x_2^2-2) = x_2^2(x_1^2-2) \Rightarrow x_1^2 x_2^2 - 2x_1^2 = x_1^2 x_2^2 - 2x_2^2 \Rightarrow x_1^2 = x_2^2 \Rightarrow x_1 = \pm x_2$$

$$x_1 = \pm x_2 \rightarrow \text{یک به یک است} \checkmark$$

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

$$g^{-1}(-\frac{1}{2}) \rightarrow g(x) = -\frac{1}{2} = \sqrt{x} - 1 \rightarrow -\frac{1}{2} + 1 = \sqrt{x} \Rightarrow \frac{1}{2} = \sqrt{x} \Rightarrow x = \frac{1}{4} = g^{-1}(-\frac{1}{2})$$

$$f(-\frac{1}{2}) + g^{-1}(-\frac{1}{2}) = -\frac{1}{2} + \frac{1}{4} = -\frac{1}{4} \quad \frac{-50+27}{\sqrt{5}} = \frac{-23}{\sqrt{5}} \checkmark$$

$$f(x) = y = x + \sqrt{x} \rightarrow x + \sqrt{x} = 1 \rightarrow x = 1 - \sqrt{x} \rightarrow y = x + 1 = f(x)$$

$$g(x) = x + 1 + \sqrt{x+1} \rightarrow g^{-1}(1) = 1 \Rightarrow x + 1 + \sqrt{x+1} = 1 \Rightarrow x + \sqrt{x+1} = 0 \Rightarrow x = -1$$

$$\rightarrow g^{-1}(1) = 0 \checkmark$$