

19/05 آزمون به

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$$f(u) = \sqrt{u+4}\sqrt{u-4} \quad \text{و} \quad g(u) = \sqrt{u-4}\sqrt{u-4}$$

$$(f+g)^2 = f^2 + g^2 + 2fg \Rightarrow u+4\sqrt{u-4} + u-4\sqrt{u-4} + 2fg \quad (1)$$

$$2fg = \sqrt{u^2-16u+48} \Rightarrow 2fg = 2\sqrt{(u-4)^2} \Rightarrow 2fg = 2u-16$$

$$\Rightarrow (f+g)^2 = 2u + 2u - 16 \Rightarrow 4u - 16 \xrightarrow{\text{بجای}} 2\sqrt{u-4} \Rightarrow a=0$$

$$\frac{a+b}{c} = \frac{0+2}{-4} = -\frac{1}{2} \quad \begin{matrix} b=2 \\ c=-4 \end{matrix}$$

$$f(u) = \frac{u+2}{u^2-4u+4} \Rightarrow \frac{u+2}{(u-1)(u-3)} \Rightarrow R = \{1, 3\} \quad (2)$$

$$g(u) = \left\{ \begin{matrix} (2, 1) \\ (1, 0) \\ (3, 0) \\ (0, 4) \end{matrix} \right\} \quad \cap \rightarrow 2, 0$$

$$g(4) = 1 \quad f(4) = -\frac{1}{4} \Rightarrow \frac{-1}{4}$$

$$g(0) = 4 \quad f(0) = \frac{2}{4} \Rightarrow \frac{1}{2}$$

$$\frac{g}{f} = \left\{ \left(\frac{2}{1} \right), \left(\frac{1}{0} \right), \left(\frac{3}{0} \right), \left(\frac{0}{4} \right) \right\}$$

$$g(u) \cap f(u) \rightarrow \left\{ \begin{matrix} (-1, 0) \\ (3, 2) \end{matrix} \right\} \quad f(u) \left\{ \begin{matrix} (-1, 4) \\ (3, -1) \end{matrix} \right\} \quad \text{ساده تر برای}$$

$$f(u) = \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right) \right\}$$

$$f(u^2) = \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right) \right\}, \left(-\sqrt{3}, -1 \right), \left(\sqrt{3}, 1 \right)$$

$$2g^2(u)+1 = \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right) \right\}$$

$$\frac{2f}{g} = \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right) \right\}$$

$$u^2 = 3 \rightarrow u = \sqrt{3}, u = -\sqrt{3}$$

$$\cap \rightarrow \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right) \right\} \quad g(u)$$

$$\hookrightarrow \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right) \right\} \quad f(u)$$

$$u = 2 \rightarrow f+g = 0$$

$$u = -2 \rightarrow f+g = 4$$

$$u = 3 \rightarrow f+g = 0$$

$$\Rightarrow h = f+g = \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(-\frac{1}{2} \right) \right\}$$

$$f(u) = \frac{\sqrt{u^2-4}}{u-2}$$

$$g(u) = [u] + [-u]$$

$$\hookrightarrow u \in \mathbb{Z} \rightarrow g(u) = 0 \rightarrow g+1 = 1$$

$$\hookrightarrow u \notin \mathbb{Z} \rightarrow g(u) = -1 \rightarrow g+1 = 0$$

$$\sqrt{u^2-4} \rightarrow u^2 \geq 4 \rightarrow u \geq 2$$

$$\sqrt{u^2-4} \geq 0 \rightarrow u^2-4 \geq 0 \rightarrow u^2 \geq 4 \rightarrow u \geq 2 \text{ یا } u \leq -2$$

$$D_f = \{0, 1, 3\}$$

$$f(u) = \sqrt{u^2-4}$$

$$g(u) = \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(\frac{5}{2} \right), \left(\frac{7}{2} \right) \right\}$$

$$\hookrightarrow \frac{u^2-4}{(u-2)(u+2)} \leq 0 \rightarrow \frac{1}{u-2} \leq 0 \rightarrow u \leq -2$$

$$h(u) = \frac{f(u)}{g(u)} = \left\{ \left(\frac{1}{2} \right), \left(\frac{3}{2} \right), \left(\frac{5}{2} \right), \left(\frac{7}{2} \right) \right\}$$

$$\begin{matrix} f(1) = 0 \\ f(2) = \sqrt{2} \\ f(3) = 2 \\ f(4) = 0 \end{matrix}$$

$$y-1 = u^3 - 3u^2 + 3u - 1 \quad \leftarrow \quad y = u^3 - 3u^2 + 3u$$

$$y-1 = (u-1)^3 \Rightarrow \sqrt[3]{y-1} = u-1 \rightarrow u = 1 + \sqrt[3]{y-1}$$

$$\hookrightarrow R = \mathbb{R}$$

$$y = \frac{1}{u^2-2} \Rightarrow yu^2 - 2yu = 1 \Rightarrow yu^2 - 2yu - 1 = 0$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad 2y \rightarrow \neq 0$$

$$\Delta \geq 0 \Rightarrow 4y^2 + 4y \geq 0$$

$$y(4y+4) \geq 0 \rightarrow y \geq -1$$

$$\Rightarrow \mathbb{R} = (-\infty, -1] \cup (0, +\infty)$$

$$(1) \quad y = u^2 - 4u + 6 \rightarrow \frac{y}{u} = \frac{u^2-4u+6}{u} = u - 4 + \frac{6}{u} \Rightarrow [4, +\infty)$$

$$(2) \quad y = u^2 + 4u + 3 \rightarrow \frac{y}{u} = \frac{u^2+4u+3}{u} = u + 4 + \frac{3}{u} \Rightarrow (-\infty, 1] \cup [3, +\infty)$$

$$(3) \quad y = \sqrt{u^2-4u+4} \rightarrow \frac{y}{u} = \frac{\sqrt{u^2-4u+4}}{u} \Rightarrow [0, +\infty)$$

$$(4) \quad y = \sqrt{u^2+4u} \rightarrow \frac{y}{u} = \frac{\sqrt{u^2+4u}}{u} \Rightarrow [0, 3]$$

$$(5) \quad y = u^3 - 3u^2 + 3u + 1 \Rightarrow R = \mathbb{R}$$

$$(6) \quad y = \sqrt{u^3 - 9u^2 + 14u + 1} \Rightarrow R = [0, +\infty)$$

$$(7) \quad y = \frac{u+1}{u-2} \Rightarrow R = \left\{ \frac{a}{c} \right\} \Rightarrow R = \{ \frac{1}{2} \}$$

$$(8) \quad y = \frac{u+1}{u+1} \Rightarrow R = \left\{ \frac{a}{c} \right\} \Rightarrow R = \{ 1 \}$$

$$f_{(2n)} = \left\{ \left(\frac{1}{2}, 2 \right) \left(\frac{\sqrt{2}}{2}, -1 \right) (2, 2) \left(-\frac{1}{2}, 4 \right) \right\} \quad \text{ن های } f \text{ باید تخیم برابر شوند!} \quad (3)$$

$$f_{(2)} = \left\{ (1, 2) (-1, 2) (\sqrt{2}, -1) (-\sqrt{2}, -1) (2, 2) (-2, 2) \right\} \quad \text{همه ن های } f \text{ را برابر } n \text{ قرار دهیم!}$$

$$g_{(n)} + 1 = \left\{ (-2, 19) (1, 3) (3, 9) (-1, 1) \right\} \quad \text{این عمل روی و های و اعمال می شود:}$$

$$\frac{2f}{g} = \left\{ \left(1, \frac{2x-2}{-1} \right) \left(3, \frac{2x-1}{2} \right) \text{ و } \left(-1, \frac{2x-4}{2} \right) \right\} = \left\{ (1, -2) (3, -1) \right\}$$