

برای مثال ۱ و ۲ را بنویسید.

۱۴، ۵

$$(1! + 2! + 3! + 4! + 5! + \dots) (2! + 4! + 6! + \dots) \Rightarrow \underbrace{(1+2+3+4+5+\dots)}_{\text{مجموعه اول}} \underbrace{(2+4+6+\dots)}_{\text{مجموعه دوم}} \Rightarrow \underbrace{(1+2+3+4+5+\dots)}_{\text{مجموعه اول}} \underbrace{(2+4+6+\dots)}_{\text{مجموعه دوم}}$$

(۱)

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$$\text{الف) } \sqrt[4]{(4+\sqrt{4})^{-1}} \times \sqrt{1+\sqrt{4}} = (4+\sqrt{4})^{-\frac{1}{4}} (1+\sqrt{4})^{\frac{1}{2}}$$

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$$= (1+\sqrt{4})^{\frac{1}{2}} (4+\sqrt{4})^{-\frac{1}{4}} = \left(\frac{(1+\sqrt{4})^2}{(4+\sqrt{4})} \right)^{\frac{1}{4}} \Rightarrow \left(\frac{1+4+2\sqrt{4}}{4+\sqrt{4}} \right)^{\frac{1}{4}} = \left(\frac{1+2\sqrt{4}}{4+\sqrt{4}} \right)^{\frac{1}{4}} = \left(\frac{2(1+\sqrt{4})}{4+\sqrt{4}} \right)^{\frac{1}{4}} = (2)^{\frac{1}{4}} = \sqrt[4]{2}$$

$$\text{ب) } \frac{\sqrt{2+\sqrt{5}}}{\sqrt{10}+2} = \frac{\sqrt{2+\sqrt{5}}}{\sqrt{2}(\sqrt{5}+2)} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} \quad / \quad (\sqrt{5}-\sqrt{5}) - (\sqrt{2+\sqrt{5}} - \sqrt{2+\sqrt{5}}) = \left(\frac{\sqrt{5}}{2} - \sqrt{\frac{1}{2}} \right) - \left(\sqrt{\frac{5}{2}} + \sqrt{\frac{1}{2}} \right)$$

$$a+b=3$$

$$2\sqrt{ab} = \sqrt{5} \rightarrow ab = \frac{5}{4}$$

$$a = \frac{5}{4} \quad b = \frac{1}{4}$$

$$= -2\sqrt{\frac{1}{2}} = -2\frac{1}{\sqrt{2}} = -\sqrt{2}$$

$$\frac{\sqrt{2}}{2} \times \sqrt{2} = -\frac{2}{2} = -1$$

$$\text{الف) } \frac{2\sqrt{2}+3\sqrt{3}}{5-\sqrt{4}} - 2(\sqrt{4}-1)^{-1} \Rightarrow \frac{2\sqrt{2}+3\sqrt{3}}{5-\sqrt{4}} \times \frac{(5+\sqrt{4})}{(5+\sqrt{4})} = \frac{10\sqrt{2}+19\sqrt{3}}{19} = \frac{10(\sqrt{2}+\sqrt{3})}{19} = \sqrt{2}+\sqrt{3}$$

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$$2\left(\frac{1}{\sqrt{4}-1}\right) = \frac{2 \times \sqrt{4}+1}{\sqrt{4}-1 \times \sqrt{4}+1} = \frac{2\sqrt{4}+2}{4-1} = \frac{2(\sqrt{4}+1)}{3} = \sqrt{4}+1 \quad (\sqrt{2}+\sqrt{3}) - (\sqrt{4}+1) = \sqrt{2}-1$$

$$\text{ب) } \frac{3\sqrt{3}-1}{4+\sqrt{3}} + \frac{1}{2-\sqrt{3}} \rightarrow \frac{1}{2-\sqrt{3}} \times \frac{(2+\sqrt{3})}{(2+\sqrt{3})} = \frac{2+\sqrt{3}}{1} \rightarrow 2+\sqrt{3}+\sqrt{3}-1 = \sqrt{3}+1$$

$$\frac{3\sqrt{3}-1}{4+\sqrt{3}} \times \frac{(4-\sqrt{3})}{(4-\sqrt{3})} = \frac{12\sqrt{3}-9-4-\sqrt{3}}{13} = \frac{11\sqrt{3}-13}{13} = \sqrt{3}-1$$

$$\frac{\sqrt{1+\sqrt{3}} + \sqrt{\sqrt{3}-1}}{\sqrt{\sqrt{3}-\sqrt{2}}} - 2 \Rightarrow \sqrt{1+\sqrt{3}} + \sqrt{\sqrt{3}-1} = A \rightarrow A^2 = \sqrt{3} + 2\sqrt{(1+\sqrt{3})(\sqrt{3}-1)} = \sqrt{3} + 2\sqrt{2} \rightarrow A = \sqrt{2(\sqrt{3}+\sqrt{2})}$$

$$= \sqrt{\frac{2(\sqrt{3}+\sqrt{2})}{\sqrt{3}-\sqrt{2}}} - 2 \rightarrow \frac{\sqrt{3}+\sqrt{2}}{\sqrt{3}-\sqrt{2}} \cdot \frac{(\sqrt{3}+\sqrt{2})}{\sqrt{3}+\sqrt{2}} = 5+2\sqrt{6} \rightarrow \sqrt{2(5+2\sqrt{6})} = \sqrt{1+4\sqrt{6}}$$

$$(\sqrt{4+2})^2 = 1+4\sqrt{6}$$

$$\sqrt{1+4\sqrt{6}} - 2 = \sqrt{4}$$

$$ج) \sqrt[4]{\sqrt{2} \times \sqrt[4]{142}} \times \sqrt[4]{\sqrt[4]{2}} = \sqrt[4]{2} \times \sqrt[4]{142} \times \sqrt[4]{2} = \sqrt[4]{2 \times 142 \times 2} = \sqrt[4]{568} = \sqrt[4]{2^3 \times 71} = 2\sqrt[4]{71} = 12$$

$$\frac{2^x (1+2^4+2^5+2^6+2^7+2^8)}{2^{x-2} (1+2+2^2+2^3+2^4+2^5)} = \frac{2^x \times 242}{2^{x-2} \times 42} = 5 \quad - 5$$

$$\frac{2^x}{9} \times \frac{2^x}{2^{x-2}} = 5 \rightarrow \frac{2^x}{2^{x-2}} = \frac{1}{9} \rightarrow \frac{2^x}{2^{x-2}} \times \frac{1}{9} = 1 \rightarrow \frac{2^x}{2^{x-2}} = 9$$

$$2 \left(\frac{2}{9} \right)^x = 9 \rightarrow \left(\frac{2}{9} \right)^x = \frac{9}{2} \rightarrow \boxed{x=2}$$

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$$(a^2+b^2+2ab)(a^2+b^2-2ab)$$

$$= a^4 - 2a^2b^2 + b^4 \rightarrow \sqrt{4-2} + \sqrt{4+2} - \sqrt{2} = \sqrt{4} - \sqrt{2} = 2(1-\sqrt{2}) \quad (2+\sqrt{2})(\sqrt{4}-\sqrt{2}) \quad - 9$$

$$2 \left(\sqrt{4-2} \sqrt{4+2} \right)$$

$$t = \frac{\sqrt{4-2} \times \sqrt{4+2}}{\sqrt{2} \times \sqrt{2}} = \frac{\sqrt{4-2} \times \sqrt{4+2}}{2} = \frac{\sqrt{4^2-2^2}}{2} = \frac{\sqrt{12}}{2} = \sqrt{3}$$

$$\sqrt{(4-2)(4+2)} = 2\sqrt{4-2} = 2\sqrt{2}$$

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$$a = \sqrt[4]{(2-\sqrt{2})^2} = \sqrt[4]{2-\sqrt{2}}$$

$$a + \frac{1}{a} = 2 \rightarrow 2 \sqrt[4]{2-\sqrt{2}} - 2 \sqrt[4]{2-\sqrt{2}} = 0$$

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$$\left(a + \frac{1}{a} \right)^2 = a^2 + \frac{1}{a^2} + \frac{2}{a} \rightarrow (2-\sqrt{2})^2 + \frac{1}{(2-\sqrt{2})^2} + \frac{2}{2-\sqrt{2}} = 1+2\sqrt{2} \quad \left. \vphantom{\frac{1}{(2-\sqrt{2})^2}} \right\} = 12$$

$$\frac{1}{2+\sqrt{2}} \cdot \frac{2+\sqrt{2}}{2+\sqrt{2}} = \frac{2+\sqrt{2}}{4-2} = \frac{2+\sqrt{2}}{2} = 1+\frac{\sqrt{2}}{2}$$

$$((a-b)^2)^2 ((a+b)^2)^2 = (a^2 - b^2)^4 \quad \cdot -4$$

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

$$\leftarrow (4+2-2\sqrt{12}) = 14(2-\sqrt{3})$$

• است 14 $\leftarrow t$

$$\left((a+\frac{1}{a})^2 - 2\right)^2 = \left(a^2 + \frac{1}{a^2} + 2 - 2\right)^2 = \left(a^2 + \frac{1}{a^2}\right)^2 \quad -\checkmark$$

$$v - 4\sqrt{3} + \frac{1}{v - 4\sqrt{3}} + 2 = 9 - 4\sqrt{3} + \frac{v + 4\sqrt{3}}{49 - 49} = 14$$

$$v^t = 14 \rightarrow t = 4$$