

$$\underbrace{(1 + \sqrt{2} + \sqrt{3} + \dots)}_{\sqrt{2} = \text{جان}} \times \underbrace{(1 + \sqrt{2} + \sqrt{3} + \dots)}_{\sqrt{2} = \text{جان}} = \dots \frac{2}{5}$$

جان ۲

$$\left(\frac{\sqrt{2} + \sqrt{5}}{\sqrt{10} + 1} \right) \times \frac{\sqrt{10} - 1}{\sqrt{10} - 1} = \frac{2\sqrt{2}}{4} = \frac{\sqrt{2}}{2}$$

$$\left(\sqrt{2} - \sqrt{5} - \sqrt{3} + \sqrt{5} \right) \times \frac{\sqrt{2}}{2} = \frac{\sqrt{4 - 2\sqrt{5}} - \sqrt{4 + 2\sqrt{5}}}{2}$$

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

$$(1 + \sqrt{2}) \times \frac{1}{2 + \sqrt{2}} \times \frac{2 - \sqrt{2}}{2 - \sqrt{2}} = 1$$

جان باب ۲

$$\frac{2\sqrt{3} - 1}{2 + \sqrt{3}} \times \frac{2 - \sqrt{3}}{2 - \sqrt{3}} = \frac{12\sqrt{3} - 13}{13} = \sqrt{3} - 1$$

$$\frac{1}{2 - \sqrt{3}} \times \frac{2 + \sqrt{3}}{2 + \sqrt{3}} = \frac{2 + \sqrt{3}}{4 - 3}$$

$$2 + \sqrt{3} + \sqrt{3} - 1 = 2\sqrt{3}$$

(ب) $\frac{\sqrt{8} + \sqrt{2}}{5 - \sqrt{4}} \times \frac{5 + \sqrt{4}}{5 + \sqrt{4}} = \frac{(\sqrt{8} + \sqrt{2})(5 + \sqrt{4})}{19}$

$$\frac{10\sqrt{2} + 15\sqrt{2} + 4\sqrt{2} + 9\sqrt{2}}{19} = \sqrt{2} + \sqrt{3}$$

$$\frac{\sqrt{2} + \sqrt{3} - 2}{\sqrt{3} - 1} \times \frac{\sqrt{3} + 1}{\sqrt{3} + 1} = \sqrt{2} + \sqrt{3} - \sqrt{3} - 1 = \sqrt{2} - 1$$

$$\sqrt[12]{2^8} \times \sqrt[12]{2^4} \times \sqrt[12]{2^8} = \sqrt[12]{2^{20}} = 2 \times 2 = 4$$

(الف) $\frac{\sqrt{1 + \sqrt{3}} + \sqrt{\sqrt{3} - 1}}{\sqrt{\sqrt{3} - \sqrt{2}}} \times \frac{\sqrt{\sqrt{3} + \sqrt{2}}}{\sqrt{\sqrt{3} + \sqrt{2}}} =$

$\sqrt{4 + 2\sqrt{4}} - 2$

$$\frac{3^x(1 + 2 + 9 + 2\sqrt{2} + 2\sqrt{3})}{3^{x-2}(1 + 2 + 4 + 1 + 4 + 22)} = 5^2 \rightarrow 3^x \times 3^4 = 5^2 \times 3^2 \times 3^2$$

$$3^x \times 81 = 2 \times 119 \rightarrow 3^x \times 91 = 2 \times 91 \rightarrow 3^x = 2$$

$$x - 2 = 0 \rightarrow x = 2$$

$$(a-b)^{\frac{1}{2}}(a+b)^{\frac{1}{2}} = (a^{\frac{1}{2}} - b^{\frac{1}{2}})^{\frac{1}{2}} = (2\sqrt{4} - 2\sqrt{2})^{\frac{1}{2}} = 2^{\frac{1}{2}} + 1 - \sqrt{12}$$

$$22 - 12\sqrt{3} = 12(2 - \sqrt{3}) \rightarrow t = 12$$

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

$$2 - 2\sqrt{3} + \frac{1}{2 - 2\sqrt{3}} + 2 = 2 - 2\sqrt{3} + 2 + 2\sqrt{3} + 2 = 14 \Rightarrow 2 \rightarrow t = 2$$

$$\sqrt[10]{2^3 \times 2^2} \times (2)^{\frac{1}{10}} \rightarrow \sqrt[10]{2^{10}} \times \sqrt[10]{2^2} = \sqrt[10]{2^{10} \times 2^2} = 2$$

$$(2 \times 2)^{-\frac{1}{2}} = \left(\frac{1}{2} \right)^{\frac{1}{2}} \Rightarrow 2^{-1} = \left(\frac{1}{2} \right)$$

$$\sqrt[3]{a} = 2\sqrt[3]{a^{\frac{10}{3}}} \rightarrow a = 2^3 a^{\frac{10}{3}} \rightarrow \frac{1}{a} = \frac{1}{2^3 a^{\frac{10}{3}}}$$

$$1 = 2^3 a^{\frac{10}{3}} \rightarrow a^{\frac{10}{3}} = \frac{1}{2^3} \rightarrow a^{\frac{1}{3}} = \frac{1}{2^3} \rightarrow \frac{1}{a^{\frac{1}{3}}} = 2^3 \rightarrow \frac{1}{a} = \sqrt[3]{2^9} = 2^3$$

$$\frac{2\sqrt{3} - 2}{1 + \sqrt{3}} \times \frac{1 - \sqrt{3}}{1 - \sqrt{3}} = \frac{2\sqrt{3} - 2 - 2 + 2\sqrt{3}}{-2} = 2 - 2\sqrt{3}$$

$$\sqrt{x+a} - 2 = \sqrt{x-4} \rightarrow \sqrt{x+a} + \sqrt{x+a} - 2 - 2 = \sqrt{x-4} + \sqrt{x-4} - 2 - 2$$

$$\sqrt{x-4} + 2 = \sqrt{x+a}$$

$$2\sqrt{x+a} - 2 = 2\sqrt{x-4} \rightarrow \sqrt{x+a} - 1 = \sqrt{x-4} \rightarrow 2\sqrt{x-4} = 2\sqrt{x+a} - 2$$