

$$\Delta! = 120 \Rightarrow (1! + 3!) \times (2! + 4!) = (1 + 3 \times 2) \times (2 \times 1 + 4 \times 2 \times 1)$$

$$\Rightarrow \underbrace{(1+6)}_{\text{کان: ۷}} \times \underbrace{(2+24)}_{\text{کان: ۶}}$$

$$4 \times V = 62 \Rightarrow \textcircled{2} = \underline{\underline{\text{كان}}}$$

$$\text{الف) } \int \frac{1}{f+\sqrt{v}} \times (1+\sqrt{v})^r = \int \frac{\sqrt{v+1+\sqrt{v}}}{f+\sqrt{v}} = \int \frac{1+\sqrt{v}}{f+\sqrt{v}} = \int \frac{r(f+\sqrt{v})}{f+\sqrt{v}} = \int r = r$$

$$\rightarrow \frac{\sqrt{r+\sqrt{a}}}{\sqrt{10}+r} = \frac{\sqrt{r+\sqrt{a}}}{\sqrt{r}(\sqrt{a}+\sqrt{r})} = \frac{1}{\sqrt{r}} = \frac{\sqrt{r}}{r} \Rightarrow \frac{\sqrt{r}}{r} (\sqrt{r}\sqrt{a} - \sqrt{r+\sqrt{a}})$$

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

$$\Rightarrow \frac{1}{r} (\sqrt{a}+1 - \sqrt{a}-1) = \frac{1}{r} x - y = -\frac{r}{r} = \boxed{-1}$$

$$\text{vi)} \frac{1\sqrt{2} + 3\sqrt{3}}{2 - \sqrt{4}} \times \frac{2 + \sqrt{4}}{2 + \sqrt{4}} = \frac{10\sqrt{2} + 12\sqrt{3} + 12\sqrt{3} + 3\sqrt{12}}{4 - 4} = \frac{10\sqrt{2} + 6\sqrt{2} + 10\sqrt{3} + 6\sqrt{3}}{19} = \frac{16\sqrt{2} + 16\sqrt{3}}{19}$$

$$\Rightarrow \frac{19\sqrt{r} + 19\sqrt{r}}{19} = \sqrt{r} + \sqrt{r} \Rightarrow \sqrt{r} + \sqrt{r} - \frac{r}{\sqrt{r}-1} \times \frac{\sqrt{r}+1}{\sqrt{r}+1}$$

$$\Rightarrow \frac{\sqrt{r} + \sqrt{r} - r\sqrt{r} + r}{r} = \sqrt{r} + \sqrt{r} - \sqrt{r} - 1 = \boxed{\sqrt{r} - 1}$$

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

$$\frac{1}{r-\sqrt{r}} \times \frac{r+\sqrt{r}}{r+\sqrt{r}} = \frac{r+\sqrt{r}}{r-r} = \frac{r+\sqrt{r}}{r-\sqrt{r}} \rightarrow \frac{\sqrt{r}\sqrt{r}+1}{r-\sqrt{r}} + (r-\sqrt{r})^{-1} = \sqrt{r}-1 + r+\sqrt{r} = r\sqrt{r}+1$$

$$\begin{aligned} \text{الف) } \sqrt{1+\sqrt{3}+\sqrt{3}-1} &= \sqrt{1+\sqrt{3}+\sqrt{3}-1+\sqrt{3}-1} = \sqrt{2\sqrt{3}+\sqrt{3}} \Rightarrow \\ \frac{\sqrt{2\sqrt{3}+\sqrt{3}}}{\sqrt{\sqrt{3}-\sqrt{3}}} \times \frac{\sqrt{\sqrt{3}+\sqrt{3}}}{\sqrt{\sqrt{3}\sqrt{3}}} &\Rightarrow \sqrt{\frac{4+2\sqrt{3}+2\sqrt{3}+4}{3-3}} = \sqrt{\frac{1+4\sqrt{3}}{1}} = \sqrt{(\sqrt{3}+2)^2} \\ &= \sqrt{4+2-2} = \sqrt{4} \end{aligned}$$

$$\text{—) } \sqrt[12]{x^8} \times \sqrt[6]{x^2} \times \sqrt[12]{x^2} = \sqrt[12]{x^8 \times x^4 \times x^2} = \sqrt[12]{x^{14}} = x^{\frac{14}{12}} = x^{\frac{7}{6}} = x^1 \times x^{\frac{1}{6}} = x \sqrt[6]{x}$$

$$\frac{r^x (1 + r + 9 + 2\sqrt{r} + 1 + 2\sqrt{r})}{r^x (\frac{1}{r} + \frac{1}{r} + 1 + r + 9 + 1)} = 2r \Rightarrow \frac{r^x \times 34r}{r^x \times \frac{4r}{r}} = 2r$$

$$\Rightarrow r^x \times 34r = r^x \times 119 \rightarrow \frac{r^x}{r^x} = \frac{119}{34r} = \frac{9}{r} \Rightarrow \left(\frac{r}{r}\right)^x = \left(\frac{r}{r}\right)^9 \Rightarrow \boxed{x=9}$$

$$(a^r + b^r - rab)^r (a^r + b^r + rab)^r = ((a^r + b^r)^r - (rab)^r)^r = (a^r + b^r + rab^r - rab^r)^r - 4$$

$$\Rightarrow (a^r + b^r - rab^r)^r = (\sqrt{4} - r + \sqrt{4} + r - r(\sqrt{4} + r \times \sqrt{4} - r))^r$$

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

$$= r(1 - \sqrt{r})^r = r^r - 14\sqrt{r} = 14(r - \sqrt{r}) \Rightarrow 14(r - \sqrt{r}) = r \Rightarrow \boxed{r=14}$$

$$(a + \frac{1}{a} + \sqrt{r})^r (a + \frac{1}{a} - \sqrt{r})^r = ((a + \frac{1}{a})^r - \sqrt{r}^r)^r = a^r + \frac{1}{a^r} + r^r$$

$$= (a^r + \frac{1}{a^r})^r = a^r + \frac{1}{a^r} + r \xrightarrow{a = \sqrt{r - \sqrt{r}}} \sqrt{r - \sqrt{r}} + \frac{1}{\sqrt{r - \sqrt{r}}} + r$$

$$= \sqrt{r - \sqrt{r}} + \sqrt{r - \sqrt{r}} + r = 14 + r = 14 = r^r = r^1$$

$$A = \sqrt[r]{r^r \sqrt{14}} \times \left(\frac{1}{r}\right)^{-\frac{r}{r}} = r^{\frac{r}{r}} \times r^{\frac{r}{r}} \times r^{\frac{r}{r}} = r^{\frac{r+r+r}{r}} = r^{\frac{3r}{r}} = r^3$$

$$= r^r \Rightarrow A = r \Rightarrow (rA)^{-\frac{1}{r}} = r^{-\frac{1}{r}} = \frac{1}{r^{\frac{1}{r}}} = \frac{1}{r}$$

$$a^{\frac{1}{r}} = r^r \times a^{\frac{1}{r}} \Rightarrow a^{\frac{1}{r}} = r^{-r} \Rightarrow a^r = r^{-r} \Rightarrow a = r^{-\frac{r}{r}} \Rightarrow a = \frac{1}{r}$$

$$\Rightarrow \frac{1}{a} - r = r\sqrt{r} - r \Rightarrow \frac{\frac{1}{a} - r}{1 + \sqrt{r}} = \frac{r\sqrt{r} - r}{1 + \sqrt{r}} \times \frac{1 - \sqrt{r}}{1 - \sqrt{r}} = \frac{r\sqrt{r} - r}{1 - r}$$

$$\Rightarrow \frac{r(1 - r\sqrt{r})}{r} = r - r\sqrt{r}$$

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