

$$(1! + 2! + 3! + \dots + 25!) (2! + 4! + 6! + \dots + 48!) \\ 1 + 2 = 3 \quad 2 + 4 = 6$$

$$9 \times 7 = 63 \rightarrow \text{رقم یکان}$$

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

$$\text{ب) } \frac{\sqrt{2} + \sqrt{5}}{\sqrt{10} + 2} = \frac{\sqrt{2} + \sqrt{5}}{\sqrt{2}(\sqrt{5} + \sqrt{2})} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2} (\sqrt{2} - \sqrt{5} - \sqrt{2} + \sqrt{5}) = 0$$

$$\frac{\sqrt{4-2\sqrt{5}} - \sqrt{4+2\sqrt{5}}}{2} = \frac{\sqrt{(1-\sqrt{5})^2} - \sqrt{(\sqrt{5}+1)^2}}{2} = \frac{1-\sqrt{5} - \sqrt{5}-1}{2} = -1$$

$$\text{الف) } \frac{(\sqrt{8} + \sqrt{2})}{\sqrt{5}-\sqrt{3}} \times \frac{(\sqrt{5}+\sqrt{3})}{2\sqrt{5}-9} = \frac{1}{\sqrt{3}-1} \times \frac{\sqrt{3}+1}{\sqrt{3}+1} = \frac{1(\sqrt{3}+\sqrt{3})}{1} = 2\sqrt{3}$$

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

$$\frac{3^x(1+3^x+3^{2x}+3^{3x}+3^{4x}+3^{5x})}{3^{x-2}(1+3+3^2+3^3+3^4+3^5)} = 3^2 \quad \frac{3^x}{3^{x-2}} \times \frac{9}{9} = 9 \\ \frac{3^x}{3^{x-2}} = \frac{9}{1} = 9 \quad \boxed{x=2} \\ \boxed{\text{جواب سوال 5}}$$

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

$$\text{ب) } \sqrt[12]{2^8} \times \sqrt[12]{3^4} \times \sqrt[12]{4^3} \times \sqrt[12]{5^2} = \sqrt[12]{2^8 \times 3^4 \times 4^3 \times 5^2} = \sqrt[12]{2^8 \times 3^4 \times 2^6 \times 5^2} = \sqrt[12]{2^{14} \times 3^4 \times 5^2} = 12$$

$$ab = \sqrt[r]{9-r} = \sqrt[r]{r}$$

$$(a-b)^r (a+b)^r = (a^r - b^r)^r = \left((\sqrt{9-r} - \sqrt{9+r})^r \right)^r =$$

$$\sqrt{9-r} + \sqrt{9+r} - 2\sqrt{9-r} = (\sqrt{9-r} - \sqrt{9+r})^r = 2r + 1 - 19\sqrt{r} = 3r - 19\sqrt{r}$$

$$= 19(r - \sqrt{r}) = t(r - \sqrt{r}) \quad \boxed{t = 19}$$

6

$$a = \sqrt[r]{(r-\sqrt{r})^r} = \sqrt{r-\sqrt{r}} \quad \frac{1}{a} = \frac{1}{\sqrt{r-\sqrt{r}}} \times \frac{\sqrt{r+\sqrt{r}}}{\sqrt{r+\sqrt{r}}} = \sqrt{r+\sqrt{r}}$$

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

$$\boxed{t = r}$$

7

$$A = \sqrt[r]{r^r} \times r^r \times r^{\frac{r}{r}} = \sqrt[r]{r^r} \times r^{\frac{r}{r}} = r^{\frac{r}{r}} \times r^{\frac{r}{r}} = r^r$$

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

8

$$a^{\frac{1}{r}} = rV a^{\frac{1}{r}} \quad a^{-r} = rV \quad a^{-1} = \sqrt{rV} \quad \frac{1}{a} = \sqrt{rV} = r\sqrt{r}$$

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

$$\frac{r}{r} \times r(r - \sqrt{r}) = \boxed{r - r\sqrt{r}}$$

9

$$\sqrt{x+a} - \sqrt{x-r} = r \quad (\sqrt{x+a} - \sqrt{x-r})(\sqrt{x+a} + \sqrt{x-r}) = r(\sqrt{x+a} + \sqrt{x-r})$$

$$x+a - x+r = r\sqrt{x+a} + r\sqrt{x-r} \quad a = r(\sqrt{x+a} + \sqrt{x-r} - r)$$

$$\sqrt{x+a} + \sqrt{x-r} - r = \frac{a}{r}$$

10