

$$1 + \frac{(2 \times 2 \times 4)}{6} + \frac{(2 \times 4 \times 4 \times 4)}{120} + \frac{(1 \times 2 \times 2 \times 4 \times 4 \times 4 \times 4)}{5040} \rightarrow \text{رقم یکان ۷}$$

$$\frac{(2 \times 4)}{2} + \frac{(1 \times 2 \times 4 \times 4)}{24} + \frac{(1 \times 2 \times 4 \times 4 \times 4 \times 4)}{720} \rightarrow \text{رقم یکان ۶}$$

$$\rightarrow \sum_{x=1}^{\infty} \frac{1}{x} = 2.2 \rightarrow \boxed{\text{رقم یکان ۲}}$$

$$\text{الف) } \sqrt[3]{(4+\sqrt{7})^{-2}(1+\sqrt{7})} = \sqrt[3]{(1+\sqrt{7})(4-\sqrt{7})} = \sqrt[3]{\frac{1-\sqrt{7}}{3}}$$

$$= \sqrt[3]{-2}$$

$$\text{ب) } \frac{\sqrt{a^2-11^2} - \sqrt{a+11^2}}{2} = \frac{\sqrt{a}-1-\sqrt{a}-1}{2} = \frac{-2}{2} = \boxed{-1}$$

$$3^n + (3^n \times 3) + (3^n \times 3^2) + \dots + (3^n \times 3^5) = 3^n(1+3+9+27+81+243) =$$

$$= 3^n \times 363 = 3^n \times 3^2 \times 41 = 3^n \times 12 \times 41$$

$$2^n(2^{-2} + 2^{-1} + 1 + 2 + 4 + 8) = 2^n \times \frac{53}{2}$$

$$\frac{3^n}{2^n} = 52 \times \frac{53}{104} \rightarrow \left(\frac{3}{2}\right)^n = 2.25 \rightarrow \boxed{n=2}$$

$$\text{الف) } \sqrt{216 + 144} = \sqrt{360} = \sqrt{36 \times 10} = 6\sqrt{10}$$

$$\rightarrow \sqrt{6} + 2 - 2 = \boxed{\sqrt{6}}$$

$$\Rightarrow \sqrt[12]{2^{12}} \times \sqrt[4]{3^{12} \times 2^2} \times \sqrt[12]{2^{12} \times 2} = \boxed{2 \times 3 \times 2 = 12}$$

$$\text{الف) } \frac{1}{\sqrt{2}-1} + \frac{\sqrt{3}-1}{\sqrt{2}+1} = \sqrt{2} + 1 \rightarrow \sqrt{2}\sqrt{3} - \frac{2}{\sqrt{2}+1}$$

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

$$\text{ب) } \frac{(\sqrt{3}-1)}{14} + \frac{2+\sqrt{3}}{1} = \boxed{2\sqrt{3} + 1}$$

$$(a-b)^r (a+b)^r = (a^2 - b^2)^r$$

$$\left[(\sqrt{5}-2 - \sqrt{5}+2) \right]^r = \sqrt{5}-2 + \sqrt{5}+2 - 2\sqrt{5}$$

$$\rightarrow (2\sqrt{5} - 2\sqrt{2})^r = 2^{r+1} - 2\sqrt{10} = 2^{r+1} - 2\sqrt{10} = 19(2-\sqrt{5})$$

$$\rightarrow t=19$$

$$a^r = 2 - 2\sqrt{5} \quad \left(2 - \sqrt{5} + \frac{1}{2-\sqrt{5}} \right)^r \left(\frac{2-\sqrt{5} + 2+\sqrt{5}}{1} \right)^r = 2^r$$

$$a + \frac{1}{a} = A$$

$$A^r = a^r + \frac{1}{a^r} + 2$$

$$\rightarrow 19 = 2^r \rightarrow t = 19$$

$$A = \frac{10\sqrt{5}}{\sqrt{5} \times 2^r} \times 2^{\frac{r}{2}} = \frac{10\sqrt{5}}{\sqrt{5}} \times \frac{2^{\frac{r}{2}}}{2^r} = \frac{10}{\sqrt{2}} = 5\sqrt{2}$$

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

$$\sqrt[n]{a} = n\sqrt[n]{a^{10}} = \sqrt[n]{a^{10} \times n^{10}} = \sqrt[n]{a^{10} \times n^{10}}$$

$$\sqrt[n]{a^{-12}} = n \rightarrow a^{-12} = n^n \rightarrow a^{-1} = \sqrt[n]{n^n} = \sqrt[n]{n}$$

$$\rightarrow a = \frac{1}{\sqrt[n]{n}} = \frac{n\sqrt{n}}{n\sqrt{n}} = \frac{\sqrt{n}}{n} \rightarrow \frac{\sqrt{25}-3}{4\sqrt{5}} = \frac{3(\sqrt{5}-1)(\sqrt{5}+1)}{2} = 3(2-\sqrt{5})$$

$$\sqrt{n+a} + \sqrt{n-a} = A+r$$

$$\sqrt{n+a} - \sqrt{n-a} = r$$

$$a+r = 2A+r \rightarrow A = \frac{a}{2}$$

$$\sqrt{n+a} = \sqrt{n+\frac{a}{2}} = A+r$$

$$\sqrt{n+a}$$