ببخشید ... سوالات طولانی بود برای همین به خط و درهم شد. جواب

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$1+3! = 1+1\times2\times3 = 7$

$5! = 1\times2\times3\times4\times5$

رقم یکان ۰ می‌سازد

$2! = 2$

$4! = 24$

$\underbrace{(1!+3!}_{7}+\underbrace{5!+7!+\dots+25!)}_{0}\,(\underbrace{2!+4!}_{26}+6!+\dots+26!)$

رقم یکان (۶)۲

$6! = 1\times2\times3\times\underbrace{4\times5}_{0}\times6$

$6\times7=42$

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الف)

$\sqrt[4]{(4+\sqrt7)^{-1}}=\frac{1}{\sqrt[4]{4+\sqrt7}}\cdot\sqrt{1+\sqrt7} \Rightarrow \left(\frac{1}{4+\sqrt7}\right)^{\frac14}\times\left((1+\sqrt7)^2\right)^{\frac14}=\sqrt[4]{\left(\frac{8+2\sqrt7}{4+\sqrt7}\right)}=2^{\frac14}=\sqrt[4]{2}$

$\frac{\sqrt[4]{(4+\sqrt7)^3}}{4+\sqrt7}$, $\sqrt[4]{(1+\sqrt7)^2}$

ب)

$\frac{\sqrt2+\sqrt5}{\sqrt{10}+2} \rightarrow \times\frac{\sqrt{10}-2}{\sqrt{10}-2}=\frac{\sqrt{20}-2\sqrt2+\sqrt{50}-2\sqrt5}{10-4}=\left(\frac{\sqrt2}{2}\right)\left(\sqrt{3-\sqrt5}-\sqrt{3+\sqrt5}\right)=\frac{\sqrt{6-2\sqrt5}-\sqrt{6+2\sqrt5}}{2}$

$6-2\sqrt5=(\sqrt5-1)^2 \quad 6+\sqrt5=(\sqrt5+1)^2 \Rightarrow \frac{\sqrt5-1-\sqrt5-1}{2}=-\frac{2}{2}=-1$

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$\sqrt8=2\sqrt2 \quad \sqrt{27}=3\sqrt3 \quad \sqrt[4]{9}=\sqrt[4]{3^2}=\sqrt3$

$\frac{2\sqrt2+3\sqrt3}{5-\sqrt6}-\frac{2}{\sqrt3-1}=\sqrt3+\sqrt2-\sqrt3-1=\sqrt2-1$

$\frac{2\sqrt2+3\sqrt3}{5-\sqrt6}\times\frac{5+\sqrt6}{5+\sqrt6}=\frac{19\sqrt3+19\sqrt2}{19}=\sqrt3+\sqrt2 \quad \frac{2}{\sqrt3-1}\times\frac{\sqrt3+1}{\sqrt3+1}=\frac{2\sqrt3+2}{2}=\sqrt3+1$

$\frac{3\sqrt3-1}{4+\sqrt3}\times\frac{4-\sqrt3}{4-\sqrt3}=\frac{13\sqrt3-13}{13}=\sqrt3-1$ ($16-3$)

گویا سازی جدا جدا

$\frac{1}{2-\sqrt3}\times\frac{2+\sqrt3}{2+\sqrt3}=\frac{2+\sqrt3}{1}$

$\sqrt3-1+2+\sqrt3=2\sqrt3+1$

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$\frac{\sqrt{1+\sqrt3}+\sqrt{\sqrt3-1}}{\sqrt{\sqrt3-\sqrt2}}\times\frac{\sqrt{\sqrt3+\sqrt2}}{\sqrt{\sqrt3+\sqrt2}}=\frac{6+2\sqrt6}{1}$

$6+2\sqrt6-2=4+2\sqrt6=2(2+\sqrt6)$

$3+\sqrt6+\sqrt3+\sqrt2 \dots = 6+2\sqrt6$

$\sqrt[4]{3\sqrt{2^8}}=\sqrt[4]{2^{8/3}}=2^{\frac{8}{12}}=2^{\frac23} \Rightarrow 2^{\frac23}\times3\times2^{\frac14}\times2^{\frac{13}{12}}=3\times2^{\frac{24}{12}}=3\times4=12$

$162=3^4\times2 \quad \sqrt[4]{162}=3\sqrt[4]{2} \quad \sqrt{4\sqrt[6]{2}}=2\sqrt[12]{2}=2^{\frac{12}{12}}\times2^{\frac{1}{12}}=2^{\frac{13}{12}}$

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$\frac{3^x(1+3+3^2+3^3+3^4+3^5)}{2^x(2^{-2}+2^{-1}+1+2^1+2^2+2^3)}=\left(\frac32\right)^x\times\frac{\frac{3^6-1}{3-1}}{2^{-2}\times\frac{2^6-1}{2-1}}=\left(\frac32\right)^x\left(\frac{364}{15.75}\right)=52$

$\frac{63}{4}=15\frac34$

$\frac{q^n-1}{q-1}$

$\left(\frac32\right)^x=\frac{52}{\frac{364}{15.75}}=2.25 \quad x=2$

$((a^2+b^2)-2ab)^2((a^2+b^2)+2ab)^2=(a-b)^4(a+b)^4=(a^2-b^2)^4$

$\Rightarrow\left(\left(\sqrt[4]{\sqrt{6}-2}\right)^2-\left(\sqrt[4]{\sqrt{6}+2}\right)^2\right)^4=\sqrt{6}-2+\sqrt{6}+2-2\sqrt{2}=(2\sqrt{6}-2\sqrt{2})^2$ ۶

$(2(\sqrt{6}-\sqrt{2}))^2=4(6+2-4\sqrt{3})=32-16\sqrt{3}=t(2-\sqrt{3})$

$16(2-\sqrt{3})=t(2-\sqrt{3}) \quad t=16$

$7-2\sqrt{12}=(\sqrt{4}-\sqrt{3})^2 \Rightarrow \sqrt[4]{(\sqrt{4}-\sqrt{3})^2}=\sqrt{(\sqrt{4}-\sqrt{3})}\Rightarrow a=\sqrt{2-\sqrt{3}}$

$4+3 \quad \sqrt{4}\times\sqrt{3}$

$\underbrace{\left(a+\frac{1}{a}+\sqrt{2}\right)^2\left(a+\frac{1}{a}-\sqrt{2}\right)^2}_{\text{مزدوج}}=\left(a^2+\frac{1}{a^2}+\cancel{2-1}\right)^2=a^4+2+\frac{1}{a^4}$ ۷

$\Rightarrow(2-\sqrt{3})^2+\frac{1}{(2-\sqrt{3})^2}+2=7-4\sqrt{3}+\frac{1}{7-4\sqrt{3}}+2=\cancel{7-4\sqrt{3}}+7+\cancel{4\sqrt{3}}+2=16$

$t^2=16 \quad t=4$

$\frac{1}{7-4\sqrt{3}}\times\frac{7+4\sqrt{3}}{7+4\sqrt{3}}=\frac{7+4\sqrt{3}}{\cancel{49-48}}=7+4\sqrt{3}$

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$\sqrt[5]{2^{2}\times\sqrt[3]{2^{4}}}\times\sqrt[3]{2^{4}}$

$2^{\frac{2}{5}}\times 2^{\frac{4}{15}}\times 2^{\frac{4}{3}}=2^{\frac{30}{15}}=2^2=4$ ۸

$(2\times 4)^{-\frac{1}{3}}=8^{-\frac{1}{3}}=\sqrt[3]{\frac{1}{8}}=\frac{1}{2}$

$\left(\sqrt[7]{a}=\cancel{\frac{27}{3^3}}\times a^{\frac{15}{7}}\right)^7=a=\left(3^3\times a^{\frac{15}{7}}\right)^7\Rightarrow a=3^{21}\times a^{15}$

$\frac{a}{a^{15}}=3^{21}\Rightarrow\frac{1}{a^{14}}=3^{21}$

$\sqrt[7]{\frac{1}{a^2}=3^3}=\frac{1}{a^2}=3^3\to a^2=\frac{1}{27}\to a=\frac{1}{\sqrt{27}}$ ۹

$\sqrt{27}=3\sqrt{3}$

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

$=6-3\sqrt{3}$

$(\sqrt{x+a})^2=x+a \qquad x+a-x+4=(\sqrt{x+a}+\sqrt{x-4})(\underbrace{\sqrt{x+a}-\sqrt{x-4}}_{2})$

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

$\sqrt{x+a}+\sqrt{x-4}=\frac{a+4}{2}$ ۱۰

$\frac{a+4}{2}-2=\frac{a+4-4}{2}=\frac{a}{2}$

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