۱)

$y = x^r \to x=1 \to y=1$
$\to x=r \to y=9 \Rightarrow \begin{cases} 1 = r^{A+B} \to -A+B=0 \\ 9 = r^{rA+B} \to rA+B=r \end{cases}$

$rA=r \to A=1 \quad B=-1$

$f(x) = r^B = r^{-1} = \boxed{\frac{1}{r}}$

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۲)

$\log_r^{(r^x+10)} = x+r \to r^x \times r^r = r^{rx} + 10\,r^x \to t^r + 10 = 24t \to t^r - 24t + 10 = (t-r)(t-5)$

$t=r^x = 5 \to r^x = r \to \log_r^r$

$r^x = 5 \to \log_r^5 \to \log_r^r + \log_r^5 + \log_r^{10}$

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۳)

$(\log_{r1}^r)^r + \left[(\log_{r1}^{r1} + \log_{r1}^V)\times(r\log_{r1}^{r1} + \log_{r1}^r)\log_{r1}^r\right] = t^r + \left[(\underbrace{1+1-t}_{r-t})\times(\underbrace{r+t}_{r+t})\right]$

$= t^r + r - t^r = \boxed{r}$

---

۴)

$\log_r^{(1-x)^r} + r\log_r^{(1-x)} = 0 \to 0\log_r^{(1-x)} = 0 \to \log_r^{(1-x)} = 1 \quad 1-x = 10 \to x = -9$

$\log_r^9 = r$

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۵)

$(x-r)(x^r+rx+r) = x^r - 1 = 1 - r^r = 14 \to x = \sqrt[r]{r^r} \to \log_r^{\sqrt[r]{r^r}} \to \frac{r}{r} \to r = \sqrt[r]{r^r}$

---

۶)

$\log(r-x) - \log\frac{1}{(x-r)^r} = r \to \log(r-x) - \log\frac{1}{(r-x)^r} = r \to \log\frac{r-x}{\frac{1}{(r-x)^r}} = r$

$\to \log(r-x)^r = r \to (r-x)^r = 1000 \to r-x = 10 \to x = -1$

$\log\frac{1}{\sqrt{r}} = 4\log\frac{r}{r} = 4$

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۷)

$x^{x^2-2x} = x^{3x}$ ، $x^2-2x = 3x$ ، $x^2-5x=0$ ، $x(x-5)=0$ ، $x=0$ ، $x=5$

$\frac{4+\sqrt{16+16}}{2} = 2+\sqrt{8}$

$\log_4 4 = \frac{1}{2}$ ✓

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۸)

$\frac{\log_3 8}{\log_3 16} = \frac{3\log_3 2}{4\log_3 2} = \frac{3}{4}$ ✓

$\frac{\log_3 15}{\log_3 5} = \log_5 15 = \log_5 3 + \log_5 5 = 1 + \log_5 3 = 1 + 0.7 = 1.7$

$\frac{\log_{12} 6}{\log_{12} 4} = \frac{\log_{12} 6}{2\log_{12} 2} = \frac{\log_{12} 6}{\log_{12} 4}$

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۹)

$\frac{12}{18} = \frac{2}{3}$ ✓

$\frac{18}{10} = 1.8$

$\frac{10}{3} = 3.3$

$\frac{\log_3 15}{\log_3 5} = \log_5 15 = 1 + \log_5 3 = 1 + 0.7 = 1.7$

$\frac{\log_4 6}{\log_{12} 4} = \frac{\log_2 6}{\log_2 12} = \frac{\log_2 6}{2+\log_2 3}$

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۱۰)

$a\log_2 5 - a + b\log_2 4 = 0 \rightarrow a\log_2 5 - a\log_2 2 + b\log_2 4 = 0$

$b\log_2 5 = a(1-\log_2 2) \rightarrow \frac{b}{a} = \frac{1-\log_2 2}{\log_2 5} \rightarrow \frac{\log_{10} \frac{1}{10}}{\log_{10} 5} = \frac{-1}{\log_{10} 5}$

$(\sqrt{2})^{\log_2 5} \rightarrow 5\log_2 \sqrt{2} \rightarrow 5^{\frac{1}{2}\log_2 2}, 5^{\frac{1}{2}} = \sqrt{5}$