۶

$(x-2)^2 = 2(x-2) \longrightarrow \log_{\frac{1}{2}(x-2)}^{2(x-2)} \to \log_{(x-2)}^{(x-1)(x-2)^2} \to \log_{(x-2)}^{(x-1)} = 3$

$(x-2)^4 = 2^{10} \longrightarrow x-2 = 10 \longrightarrow x = -8$

جایگذاری $\longrightarrow \log_{16}^{16} = 1$ ✓

۷

$x^3 = 2^{-2x} \longrightarrow x^3 - 2^{-2x} = 0 \longrightarrow x^3 - 2^{-2x} = 0 \longrightarrow x = \frac{8}{8+3}$ ✓

$x = \frac{8}{8-3}$ غیق

جایگذاری $\longrightarrow \log_{(2-\sqrt{8}+2)}^{4} = \log_{8}^{4} = \frac{2}{3}$ ✓

۸

$\frac{\log_3^{16}}{\log_3^{4}} = \frac{\log_3^{6\times 8}}{\log_3^{3\times 4}} \longrightarrow \frac{\log_3^{6}\log_6^{16} + \log_3^{3}\log_3^{4}}{\log_3^{6}\log_6^{4} + \log_3^{3}\log_3^{3}} = \frac{\frac{7}{12}}{\frac{7}{10}} = \frac{10}{12} = \frac{5}{6}$ ✓

۹

$\frac{\log_{24}^{3}}{\log_{4}^{3}} = \frac{\frac{1}{2}\log_2^3 + \log_4^3}{\frac{1}{4}\log_2^3 + \log_4^3} = \frac{\frac{7}{2}}{\frac{7}{4}} = \frac{14}{7} = 2$ ✓

۱۰

جایگذاری $\longrightarrow a\log 2 + b\log 2 - a = 0 \to \log 2(a+b) = a \quad \log 2 = \frac{a}{a+b} \Rightarrow \frac{1}{\log_2^{a+b}} = \frac{a}{b}$

$1 + \frac{a}{b} = \frac{1}{\log 2} \to \frac{a}{b} = \frac{1}{\log_2^2} - 1 \xrightarrow{\frac{1}{\log_a^b} = \log_b^a} \frac{b}{a} = \log_2^{10} - 1 \to \log_2^5 \times \log_5^2 - 1$

$\frac{b}{a} = \log_5^2 \xrightarrow{\text{جایگذاری}} (\sqrt{2})^{\log_2^5} \longrightarrow a^{\log_2^2} = 5^{\frac{1}{2}} = \sqrt{5}$ ✓

۱۹,۷۵

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۱

$3^{Ax+B} = x^2$ جایگذاری $x=1$ $\Rightarrow 3^{A+B} = 1 \Rightarrow A+B=0$

$x=2 \Rightarrow 3^{2A+B} = 9 \Rightarrow 2A+B=2$ $\Rightarrow B=-1$

$x=0 \Rightarrow 3^{B} \xrightarrow{B=-1} 3^{-1} \neq \frac{1}{2}$ ✗

۲

$2^{x+2} = 3^x + 15 \Rightarrow 2^x \times 2^2 = 2^{2x} + 15$

$2^x = t \Rightarrow 4t = 15 + t^2 \Rightarrow t^2 - 4t + 15 = 0$ $\begin{cases} t=5 \\ t=3 \end{cases}$

$2^x = 3 \Rightarrow \log_2 3 = x$

$2^x = 5 \Rightarrow \log_2 5 = x$

$\log_2 3 + \log_2 5 = \log_2 15$

۱,۷۵

۳

$\log_{12} 144 = \log_{12} 12^2 = 2\log_{12} 12 = 2$

$\log_{12} 18 = \log_{12}(2 \times 9) = \log_{12} 2 + \log_{12} 9$

$\Rightarrow \log_{12} 2 + 2\log_{12} 3$

$(\log_{12} 3)^2 + (\log_{12} 2 + 2\log_{12} 3)(\log_{12} 2 + 2) \Rightarrow (\log_{12} 3)^2 + (\log_{12} 2)^2 + 4\log_{12} 3 \log_{12} 2 + 2\log_{12} 3 + 2\log_{12} 2 + 4$

$= (\log_{12} 2 + \log_{12} 3)^2 + 4 = (\log_{12} 6)^2 + 4$ ✓

۴

$\log(x-1)^2 + 3\log(1-x) = 0$

$2\log|x-1| + 3\log|1-x| = 0$

$\log(x-1) = 1 \Rightarrow x-1 = 10 \Rightarrow x = 11$ ✗

$\log(1-x) = 1 \Rightarrow 1-x = 10 \Rightarrow x = -9$ ✓

$\log_3 (-9)^2 = \log_3 9^2 = 2$ ✓

۵

$\log_{x^3} 2 = \frac{1}{3}\log_x 2 \Rightarrow \log_{2^3} 2 \Rightarrow 3\log_2 2 \Rightarrow \log_2 x^3$

$\log_{x-1}(x^2+2x+3) \Rightarrow \log_2 (x^3-2^3) = 3 \Rightarrow x^3 - 2^3 = 2^3 \Rightarrow x^3 = 16$

جایگذاری $\Rightarrow \log_2 16 = 4$ ✓