①

$f(x) = 3^{Ax+B}$

$y = x^2 \to (1,1) \quad (3,9)$

$f(1) = 3^{A+B} = 1 \qquad f(3) = 3^{3A+B} = 9$

$\begin{cases} A+B=0 \\ 3A+B=2 \end{cases}$

$A=1 \qquad B=-1$

$f(0) = 3^{x-1} = 3^{-1} = \frac{1}{3}$

②

$\log_2^{4^x+15} = x+3$

$2^{x+3} = 4^x + 15$

$2^x \times 2^3 = (2^x)^2 + 15 \qquad 2^x = t$

$\to t^2 - 8t + 15 = 0$

$(t-3)(t-5) = 0 \quad \begin{cases} t=3 & x=\log_2^3 \\ t=5 & x=\log_2^5 \end{cases}$

جمع $= \log_2^3 + \log_2^5 = \log_2^{15}$

③

$(\log_{21}^3)^2 + \log_{21}^{147} \cdot \log_{21}^{1323} = ?$

$147 = 49 \times 3$

$1323 = 49 \times 27$

$\log_{21}^{147} = \log_{21}^3 + \log_{21}^{72} = 2\log_{21}^7 + \log_{21}^3$

$\log_{21}^{1323} = \log_{21}^{33} + \log_{21}^{72} =$

$3\log_{21}^3 + 2\log_{21}^7$

$\log_{21}^{21^{3\times7}} = \log_{21}^3 + \log_{21}^7$

$\log_{21}^3 = x \to \log_{21}^7 = 1-x$

$\to x^2 + (2-2x+x)(3x+2-2x)$
$\qquad\qquad (2-x) \qquad\quad (x+2)$

$x^2 + 4 - x^2 = 4$

④

$\log^{(x^2-2x+1)} + \frac{3\log^{(1-x)}}{\log^{(1-x)^3}} = 5$

$\log_3^{(-x)}\ ?$

$= \log^{(x-1)^2} = \log^{(1-x)^2}$

$\to \log^{(1-x)^2} + \log^{(1-x)^3} = 5$

$\log^{(1-x)^5} = 5 \qquad 5\log^{1-x} = 5$

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

$1-x = 10$
$x = -9$

$\log_3^9 = 2$ جواب

s.a.m

⑤ $\log_{2}^{(x^2+2x+4)} + \log_{2}^{(x-2)} = 3$

$\log^{(x-2)(x^2+2x+4)} =$

$\log_{2}^{x^3-8} = 3 \qquad x^3-8 = 8$

$x^3 = 16 \qquad x = \sqrt[3]{16}$

$\log_{\sqrt{2}}^{x} = \log_{\sqrt{2}}^{\sqrt[3]{16}} = \log_{2}^{16^{\frac{1}{3}}} =$

$\frac{1}{3}$ / $\frac{1}{3}$ $\log_{2}^{16} =$ (۴)

⑥ $\log^{(2-x)} - \log \frac{1}{(x-2)^2} = 3$

$\log \frac{2-x}{\frac{1}{(2-x)^2}} = \log_{10}^{(2-x)^3} = 3$

$(2-x)^3 = 10^3 \qquad 2-x = 10$ ← $x = -8$

$\log_{\sqrt{2}}^{-x} = \log_{\sqrt{2}}^{8} = \log_{2^{\frac{1}{2}}}^{2^3} =$

$\frac{3}{\frac{1}{2}}$ $\log_{2}^{2} =$ (۶)

⑦ $3^{x^2-2} = 81^{x}$

$3^{x^2-2} = 3^{4x}$

$x^2 - 4x - 2 = 0 \rightarrow \Delta = 16 - 4(-2) = 24$

$x = \frac{4 \pm 2\sqrt{6}}{2} = 2 \pm \sqrt{6}$

$(\sqrt{24} = 2\sqrt{6})$

$\log_{4}^{x-2}$

$x = 2+\sqrt{6} \rightarrow \log_{4}^{\sqrt{4}} = \frac{1}{2}$

$x = 2-\sqrt{6} \rightarrow \log_{4}^{-\sqrt{4}}$ تعریف نشده

⑧ $\log_{3}^{2} = \frac{5}{8} \qquad \log_{18}^{8} = ?$

$\log_{18}^{8} = \frac{\log^{8}_{3}}{\log^{18}_{3}} = \frac{3\log^{2}_{3}}{\log^{2}_{3} + 2\log^{3}_{3}} = \frac{\frac{5}{8}}{2\frac{5}{8}}$

$3^2 \times 2$ ← $\log^{18}_{3}$ (۱۸)

$= \frac{5}{7}$

s.a.m

۹) $\log_{۴}^{۳} = ۰/۸$ ، $\log_{۱۲}^{۶} = ?$

$۱۳ \over ۱۸$

$$= \frac{\log_{۴}^{۶}}{\log_{۴}^{۱۲}} = \frac{\log_{۴}^{۳} + \log_{۴}^{۲}}{\log_{۴}^{۴} + \log_{۴}^{۳}} = \frac{۱,۳}{۱,۸}$$

(۰/۸ ، ۱)

۱۰) $(a\log ۲)x^{۲} + ax + b\log ۲ = ۰$

$x = -۱ = \text{سه‌تایی} \rightarrow a + c = b$

$a\log ۲ + b\log ۲ = a$

$a - a\log ۲ = b\log ۲$

$a(۱ - \log ۲) = b\log ۲ \rightarrow \frac{b}{a} = \frac{۱ - \log ۲}{\log ۲}$

$$= \frac{\log \frac{۱۰}{۵} - \log \frac{۲}{۱۰}}{\log ۲} = \frac{\log ۵}{\log ۲} = \frac{b}{a} \Rightarrow$$

$$(\sqrt{۲})^{\frac{b}{a}} = (۲^{\frac{۱}{۲}})^{\log_{۲}^{۵}} =$$

(۲) $\frac{۱}{۲}\log_{۲}^{۵}$ $= ۵^{\frac{۱}{۲}\log_{۲}^{۲}} = ۵^{\frac{۱}{۲}} = \sqrt{۵}$