① $f(x) = 3^{Ax+B}$

$y = x^2 \rightarrow x = 1 \rightarrow 3^{A+B} = 1 \rightarrow A+B = 0$

$\rightarrow x = 3 \rightarrow 3^{3A+B} = 9 \rightarrow 3A+B = 2$

$A = 1 \quad B = -1$

$3^{Ax+B} \rightarrow 3^{x-1}$ نقطه تلاقی با y $x = 0$ $\quad 3^{-1} = \frac{1}{3}$

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② $2^{(x+3)} = 4^x + 15 \rightarrow 2^x \times 2^3 = (2^x)^2 + 15$

$\xrightarrow{2^x = t} t^2 - 8t + 15 = 0 \qquad (t-5)(t-3) = 0$

$\rightarrow t = 3 \rightarrow \log_2^3 = x \rightarrow 2^x = 3$

$\rightarrow t = 5 \rightarrow \log_2^5 = x \rightarrow 2^x = 5$

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

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③ $(\log_{21}^3)^2 + \log_{21}^{147} \times \log_{21}^{1323} \longrightarrow \log_{21}^{3 \times (21)^2} = 2 + \log_{21}^3$

$\rightarrow \log_{21}^{21 \times 7} = \log_{21}^{21} + \log_{21}^7 = 1 + \log_{21}^{21} - \log_{21}^3 = 2 - \log_{21}^3$

$(\log_{21}^3)^2 + (2 - \log_{21}^3)(2 + \log_{21}^3) = (\log_{21}^3)^2 + 4 - (\log_{21}^3)^2 = 4$

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④ $\log^{x^2-2x+1} + 3\log^{(1-x)} = 5$

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

$5\log^{(1-x)} = 5 \rightarrow \log^{(1-x)} = 1 \rightarrow 1 - x = 10 \rightarrow x = -9$

$\log_3^{(-x)} \rightarrow \log_3^9 = 2$

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⑤ $\log_2^{(x^2+2x+4)} + \log_2^{(x-2)} = 3 \rightarrow \log_2^{(x^2+2x+4)(x-2)} = 3$

$\log_2^{x^3-8} = 3 \rightarrow x^3 - 8 = 8 \rightarrow x^3 = 16 \rightarrow x = 2^{\frac{4}{3}}$

$\log_{\sqrt[3]{2}}^x \rightarrow \log_{2^{\frac{1}{3}}}^{2^{\frac{4}{3}}} \longrightarrow 4\log_2^2 = 4$

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

$\rightarrow \log(2-x) - \log(2-x)^{-2} = 3$

$\log(2-x) + 2\log(2-x) = 3 \rightarrow 3\log(2-x) = 3$

$\log(2-x) = 1 \rightarrow x = -8$

$\log_{\sqrt{2}}^{-x} = \log_{2^{\frac{1}{2}}}^{2^3} = 6$

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(7) $3^{(x^2-2)} = 81^x \rightarrow x^2-2 = 4x \rightarrow x^2-4x-2=0 \rightarrow x = 2\pm\sqrt{6}$

$\log_6^{(x-2)} =$

$\rightarrow \log_6^{2+\sqrt{6}-2} = \log_6^{\sqrt{6}} = \frac{1}{2}$

$\rightarrow \log_6^{2-\sqrt{6}-2} = \log_6^{-\sqrt{6}}$ ✗

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(8) $\log_3^2 = \frac{5}{8}$ $\quad \log_{18}^8 = \log_{18}^{2^3} = 3\log_{18}^2 = \frac{\log_3^2}{\log_3^{18}}$

$\frac{\log_3^2}{\log_3^{3^2} + \log_3^2} = \frac{\frac{5}{8}}{2+\frac{5}{8}} = \frac{\frac{5}{8}}{\frac{21}{8}} = \frac{5}{21} \xrightarrow{\times 3} 3\log_{18}^2 = \frac{5}{7}$

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(9) $\log_4^3 = 0.8 \rightarrow \frac{1}{2}\log_2^3 = \frac{4}{5} \rightarrow \log_2^3 = \frac{8}{5}$

$\log_{12}^6 = \frac{\log_2^6}{\log_2^{12}} = \frac{1+\log_2^3}{2+\log_2^3} = \frac{1+\frac{8}{5}}{2+\frac{8}{5}} = \frac{\frac{13}{5}}{\frac{18}{5}} = \frac{13}{18}$

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(10) $(a\log 2)x^2 + ax + b\log 2 = 0 \xrightarrow{x=-1} (a\log 2) - a + b\log 2 = 0$

$b\log 2 = a - a\log 2 \rightarrow b\log 2 = a(1-\log 2)$

$\frac{b}{a} = \frac{1-\log 2}{\log 2} \rightarrow \frac{\log 5}{\log 2} = \log_2^5$

$(\sqrt{5})^{\frac{b}{a}} = 2^{\frac{1}{2}\times\log_2^5} = 2^{\log_2^{5^{\frac{1}{2}}}} = 2^{\log_2^{\sqrt{5}}} = \sqrt{5}$