«به نام خدا»

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«یازدهم دهم A»

① $\boxed{1,3}$

$f(x) = 3^{Ax+B}$ $y = x^2$

$\hookrightarrow f(0) = ?$

$1 = 3^{A+B} \longrightarrow A+B=0 \longrightarrow \boxed{A=-B}$

$9 = 3^{3A+B}$ $2 = 3A - A \longrightarrow \boxed{A=1}$ $\boxed{B=-1}$

$\xrightarrow{x=0} 3^{B} = \boxed{\frac{1}{3}}$

②

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

$2^x = t$

$2^x \times 8 = 2^{2x} + 15$

$0 = t^2 - 8t + 15$ $(t-3)(t-5) = 0$

$2^x = 3$

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

$2^x = 5$

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(٣)

$$\left(\log_{٢١} ٣\right)^{٢} + \log_{٢١} ١٤٧ \; \log_{٢١} ١٣٢٣$$

$$\left(\log_{٢١} ٣\right)^{٢} + \left(٢ - \log_{٢١} ٣\right)\left(٢ + \log_{٢١} ٣\right) = ٤$$

$$٤ - \left(\log_{٢١} ٣\right)^{٢}$$

$$١٤٧ = ٢١ \times ٧$$

$$١٣٢٣ = ٢١^{٢} \times ٣$$

(٤)

$$\log(x^{٢} - ٢x + ١) + ٣ \log(١ - x)^{٣} = ٥$$

$$\log(x - ١)^{٢} + \log(١ - x)^{٣} = ٥$$

$$\log(١ - x)^{٥} = ٥ \qquad ١٠^{٥} = (١ - x)^{٥}$$

$$\boxed{x = -٩}$$

$$\log_{٣} ٩ = ٢$$

(5)

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

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

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

$$\log_{2^{\frac{1}{3}}} 16^{\frac{1}{3}} = 4$$ ✓

(6)

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

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

$$(2-x)^3 = 10^3 \longrightarrow \boxed{x = -8}$$ ✓

$$\frac{3}{2} \log_{4} 8^{2} = \boxed{\frac{3}{2}}$$

(7)

$$3^{x^2-2} = 3^{4x} \qquad x^2 - 4x - 2 = 0$$ ✓

$$\Delta = 16 - 4 \times 1 \times -2 = 16 + 8 = 24$$

$$\frac{4 \pm \sqrt{24}}{2} \qquad x = 2 \pm \sqrt{6} \longrightarrow 2 - \sqrt{6} \times$$

$$\longrightarrow 2 + \sqrt{6} \checkmark$$

$$\log_{6} (x-2) = \log_{6} (2+\sqrt{6}-2) = \log_{6} \sqrt{6} = \boxed{\frac{1}{2}}$$

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(۸)

$(3)^{\frac{5}{8}} = 2$ $\qquad$ $2^{\frac{8}{5}} = 3$

$3\log_{18} 2 = \frac{3}{\log_2 18} = \frac{3}{\log_2 9 + \log_2 2}$ ✓

$2\log_2 3 \qquad 1$

$\frac{3}{1+2\times\log_2 2^{\frac{8}{5}}} = \frac{3}{\frac{21}{5}} = \boxed{\frac{15}{21}}$ $\quad \frac{5}{7}$

(۹)

$4^{0.8} = 3 \longrightarrow 2^{1.6} = 3 \qquad 2 = 3^{\frac{1}{1.6}} = 3^{\frac{5}{8}}$

$\log_{12}\frac{12}{2} = \log_{12} 12 - \log_{12} 2 = 1 - \frac{5}{8}\log_{12} 3$

$1 - \frac{5}{8}\left(\frac{1}{\log_3 4 + \log_3 3}\right) = 1 - \frac{5}{8}\times\frac{4}{9}$

$2\log_3 2 \qquad 1$

$1 - \frac{5}{18} = \frac{13}{18}$ ✓

(۱۰)

$-1\beta = \frac{b\log 2}{a\log 2} = \boxed{\frac{-b}{a} = \beta}$

$\beta - 1 = \frac{-\alpha}{\alpha\log 2} = \frac{-1}{\log 2} = -\log_2 1 + \log_2 2$ ✓

$\log_2 \frac{1}{5} = -\log_2 5 = \beta$

$\sqrt{2}^{\,2\log_2 5} = \boxed{\sqrt{5}}$ $\qquad \frac{+b}{a} = +\log_2 5$

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