-۱

$3^{A(1)+B} = 1^2 \Rightarrow 3^{A+B} = 3^0 \Rightarrow A+B=0 \Rightarrow 2A=2 \Rightarrow A=1$ ✓ (۲)

$3^{A(2)+B} = 3^2 \Rightarrow 3^{2A+B} = 3^2 \Rightarrow 2A+B=2$ $\quad B=-1$

$f(x) = 3^{x-1} \Rightarrow y = 3^{0-1} \Rightarrow \boxed{y=\frac{1}{3}}$ ✓

-۲

$\log_2^{(3^x+5)} = x+2 \Rightarrow 3^x+5 = 2^{x+2} \Rightarrow (3^x)^2+5 = 4\times 2^x$ (۲)

$t^2-4t+5=0 \rightarrow (t-5)(t-1)=0$ $\quad t=1 \Rightarrow 3^x=1 \Rightarrow \log_3^1 = x_2$

$t=5 \Rightarrow 3^x=5 \Rightarrow \log_3^5 = x_1$

$x_1+x_2 = \log_3^5 + \log_3^1 = \boxed{\log_3^5}$ ✓

-۳

$\log_{21}^3 \times \log_{21}^{12} + (\log_{21}^{21} \times \log_{21}^3)(\log_{21}^{21})$ (۲)

$\Rightarrow \log_{21}^3 \times \log_{21}^{12} + (1+\log_{21}^3)(2+\log_{21}^3)$

$\Rightarrow \log_{21}^3 \times \log_{21}^{12} + \log_{21}^3 \times \log_{21}^3 + 2\log_{21}^3 + \log_{21}^3 + 2$

$\log_{21}^3 (\log_{21}^{12} + \log_{21}^3 + 1) + 2$ $\quad \log_{21}^{12} + \log_{21}^3 = \log_{21}^{21} = 1$

$2\log_{21}^3 + 2\log_{21}^{12} + 2 \Rightarrow \boxed{4}$ ✓

$2\log_{21}^{12} = 2$

-۴

$\log(x-1)^2 + \log -(x-1)^3 = 5 \Rightarrow \log -(x-1)^5 = 5$ (۲)

$5\log -(x-1) = 5 \Rightarrow 1-x = 10 \Rightarrow -x = 9$ ✓

$\log_3^{(9)} = \boxed{2}$ ✓

۵-

(۲)

$$\log_2 (x^2+2x+4)(x-2) = \log_2 8$$

$$\Rightarrow x^3 - 2x^2 + 2x^2 - 4x + 4x - 8 = 8$$

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

$$\log_{\sqrt[3]{2}} \sqrt[3]{16} = \boxed{4}$$ ✓

۶-

(۲)

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

$$\Rightarrow -(x-2)^3 = 10^3 \Rightarrow -(x-2) = 10 \Rightarrow -x = 8$$ ✓

$$\log_{\sqrt{2}} 8 = 6$$ ✓

۷-

(۲)

$$3^{x^2-2} = 3^{4x} \Rightarrow x^2 - 4x - 2 = 0 \Rightarrow x^2 - 4x + 4 - 4 - 2 = 0 \Rightarrow (x-2)^2 = 6$$

$$\Rightarrow (x-2) = \sqrt{6}$$

$$\boxed{\log_6 \sqrt{6} = \frac{1}{2}}$$ ✓

۸-

(۲)

$$\log_{2\times3^2} 2^3 \Rightarrow \frac{3}{\log_2 2\times3^2} \Rightarrow \frac{3}{\log_2 2 + 2\log_2 3} \Rightarrow \frac{3}{1+2(1.6)} \Rightarrow \frac{3}{4.2} = \boxed{\frac{10}{14}}$$ ✓

$$\log_3 2 = \frac{5}{8} \Rightarrow \log_2 3 = 1.6$$

۹-

(۲)

$$\frac{1}{2}\log_2 3 = 0.8 \Rightarrow \log_2 3 = 1.6 \Rightarrow \log_2 3 + \log_2 2 = 2.6 \Rightarrow \log_2 6 = 2.6$$

$$\log_{6\times2} 6 \Rightarrow \frac{1}{\log_6 6 + \log_6 2} = \frac{1}{\frac{10}{26} + \frac{26}{26}} = \boxed{\frac{13}{18}}$$ ✓

$$a\log 2 - a + b\log 2 = 0$$

$$\Rightarrow \log 2^{a+b} = a \Rightarrow \log 2^{a+b} = \log 10^{a}$$

$$\Rightarrow 2^{a} \times 2^{b} = 2^{a} \times 5^{a} \Rightarrow 2^{b} = 5^{a} \Rightarrow b\log 2 = a\log 5$$

$$\Rightarrow \frac{b}{a} = \log_2 5 \Rightarrow \sqrt{2}^{\log_2 5}$$

$$\Rightarrow 2^{\frac{1}{2}\log_2 5} \Rightarrow 5^{\frac{1}{2}\log_2 2} = \boxed{\sqrt{5}}$$ ✓

(۲)