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سها محقق تکلیف ۱۴ کلاس ریاضی ۲

سوال ۱)

$f(x)=3^{Ax+B}$ $\quad y=x^2$ $\xrightarrow{x_1=1}$ $y_1=(1)^2=1$ $\xrightarrow{y_1=f(1)}$ $3^{A+B}=3^0$

$\xrightarrow{x_2=3}$ $y_2=(3)^2=9$ $\xrightarrow{y_2=f(3)}$ $3^{3A+B}=3^2$ دقت!

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$$\begin{cases} A+B=0 \\ 3A+B=2 \end{cases} \Rightarrow A=\cancel{2}\ 1,\ B=\cancel{-2}\ -1 \Rightarrow f(x)=3^{2x-2} \xrightarrow{\left|f(0)\right.} f(0)=3^{2(0)-2}=3^{-2}$$

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

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

محل تلاقی با محور y ها : $\left|\begin{matrix}0\\ \frac{1}{9}\end{matrix}\right.$

سوال ۲)

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$\log_2(4^x+15)=x+3 \qquad 2^{x+3}=4^x+15 \Rightarrow (2^x)^2-2^x\times 8+15=0$

$(2^x-3)(2^x-5)=0$

$$\Rightarrow \begin{cases} x_1=\log_2 3 \\ x_2=\log_2 5 \end{cases} \Rightarrow \underset{\text{جواب‌ها}}{S}=\log_2 3+\log_2 5=\log_2 15$$ ✓

سوال ۳)

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$(\log_{21} 3)^2+\log_{21}(147)\log_{21} 63$

$(\log_{21} 3)^2+(\log_{21} 21\times 7)(\log_{21} (21)\times 3)=(\log_{21} 3)^2+(1+\log_{21} 7)(2+\log_{21} 3)$

$\xrightarrow{\log_{21} 7=1-\log_{21} 3}$ $(\log_{21} 3)^2+(2-\log_{21} 3)(2+\log_{21} 3)=(\log_{21} 3)^2+4-(\log_{21} 3)^2$

$=\boxed{4}$ ✓

سوال ۴)

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

$\log_{10}(1-x)^5=5 \qquad (1-x)^5=10^5 \xrightarrow{1-x>0} 1-x=10 \Rightarrow x=-9$

$\log_3 -x=\log_3 -(-9)=\boxed{2}$ ✓

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سوال ۵)

$\log_2 (x^2+2x+4) + \log_2 (x-2) = 3$ **(۲)**

$\log_2 (x^2+2x+4)(x-2) = 3 \Rightarrow x^3 - 8 = 8 \Rightarrow x^3 = 16$

$x = 2^{\frac{4}{3}}$

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

سوال ۶)

$\log (2-x) - \log \frac{1}{(x-2)^2} = 3 \quad \log \frac{(2-x)}{\frac{1}{(2-x)^2}} = 3 \quad (2-x)^3 = 10^3$ **(۲)**

$\xrightarrow{2-x>0} 2-x = 10 \Rightarrow x = -8 \quad \log_{\sqrt{2}} -x = \log_{2^{\frac{1}{2}}} 2^3 = 6$ ✓

سوال ۷)

$3^{x^2-2} = 81^x \quad 3^{x^2-2} = 3^{4x} \Rightarrow x^2 - 4x - 2 = 0 \quad (x-2)^2 - 6 = 0$ **(۲)**

$\Rightarrow (x-2) = \pm\sqrt{6} \longrightarrow \begin{cases} \sqrt{6} & \text{ق ق} ✓ \\ -\sqrt{6} & \text{غ ق ق} \end{cases} \quad \log_6 (x-2) = \log_6 \sqrt{6} = \log_6 6^{\frac{1}{2}} = \frac{1}{2}$ ✓

سوال ۸)

$\log_3 2 = \frac{5}{8} \quad \log_{18} 8 = ?$ **(۲)**

$3\log_{18} 2 = \frac{3}{\log_2 18} = \frac{3}{1+2\log_2 3} = \frac{3}{1+\frac{2}{\log_3 2}} = \frac{3}{1+\frac{2}{\frac{5}{8}}} = \frac{3}{1+\frac{16}{5}} = \frac{3}{\frac{21}{5}} = \frac{5}{7}$ ✓

سوال ۹)

$\log_4 3 = 0/8 \quad \log_{12} 6 = ? \quad \frac{1}{2}\log_2 3 = 0/8 \Rightarrow \log_2 3 = 1/6$ **(۲)**

$\log_{12} 6 = \frac{1}{\log_6 12} = \frac{1}{1+\log_6 2} = \frac{1}{1+\frac{1}{1+\log_2 3}} = \frac{1}{1+\frac{1}{1+1/6}} = \frac{1}{\frac{2/6+1}{2/6}} = \frac{2/6}{3/6} = \frac{13}{18}$ ✓

سوال ۱۰)

$(a\log 2)x^2 + ax + b\log 2 = 0 \xrightarrow{\text{-1 ریشه‌ی معادله}} a\log 2 + b\log 2 = a \Rightarrow b\log 2 = a(1-\log 2)$ **(۲)**

($1-\log 2 = \log 5$)

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