$f(x) = -2 + \left(\frac{1}{2}\right)^{Ax+B}$ ، $g = x^2 - x$ $\quad x=1, x=2$ $\quad f(2) =$

$-2 + \left(\frac{1}{2}\right)^{A+B} = 1.5 \rightarrow \left(\frac{1}{2}\right)^{A+B} = 2 \rightarrow A+B = -1$

$-2 + \left(\frac{1}{2}\right)^{2A+B} = 2 \rightarrow \left(\frac{1}{2}\right)^{2A+B} = 4 \rightarrow 2A+B = -2$

$\Big\}$ $A = -1$ ، $B = 0$

$f(2) = -2 + \left(\frac{1}{2}\right)^{-2} \rightarrow -2 + 2^2 = 2$ ← جواب

$P = P_0 \times \left(\frac{8}{9}\right)^t \rightarrow \frac{1}{5} P_0 = P_0 \times \left(\frac{8}{9}\right)^t \rightarrow \frac{1}{5} = \left(\frac{8}{9}\right)^t$ $\quad P_0$ = اولیه

$\rightarrow \log_{\frac{8}{9}} \frac{1}{5} = \log_{\frac{8}{9}} \left(\frac{8}{9}\right)^t \rightarrow -\log_{\frac{8}{9}} 5 = t \log_{\frac{8}{9}} \frac{8}{9} \rightarrow -(\log_{\frac{8}{9}} 5 + \log_{\frac{8}{9}} 5) = t(3\log_{\frac{8}{9}} 2 - 2\log_{\frac{8}{9}} 3)$

$\rightarrow -\left(\frac{10}{14} + \frac{10}{24}\right) = t\left(3 \times \frac{10}{24} - 2 \times \frac{10}{12}\right) \rightarrow t = \frac{-\left(\frac{5}{12} + \frac{5}{8}\right)}{\left(\frac{5}{4} - \frac{10}{8}\right)} = \frac{\frac{95}{24}}{\frac{5}{24}} = \frac{19}{3}$ ساعت $\rightarrow$ 3:10 دقیقه

$P = P_0 \times \left(\frac{125}{1000}\right)^t \rightarrow \frac{1}{8} P_0 = P_0 \times \left(\frac{1}{2}\right)^{3t} \rightarrow \log_{\frac{1}{2}} \frac{1}{8} = \log_{\frac{1}{2}} \left(\frac{1}{2}\right)^{3t}$

$\rightarrow t = \frac{\log_{\frac{1}{2}} \frac{1}{8}}{\log_{\frac{1}{2}} \frac{1}{2}} = \frac{\log_2 1 - \log_2 8}{\log_2 1 - 3\log_2 2} = \frac{0 - \frac{10}{3}}{\frac{10}{3} - 3} = \frac{\frac{10}{3}}{\frac{10}{3}} = 1$ ← هفته

روز: $7 \times 7 = 49$

جواب

$\left(\frac{1000 - 4}{1000}\right)^t = \frac{1}{3} \rightarrow \left(\frac{996}{1000}\right)^t = \frac{1}{3} \rightarrow \left(\frac{249}{250}\right)^t = \frac{1}{3}$ سمتی $\left(\frac{249}{250}\right)^t = 3$ تابع نمایی

$\log \left(\frac{249}{250}\right)^t = \log 3$

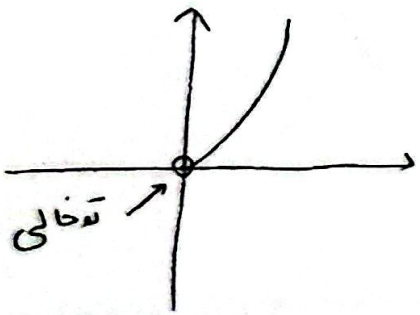
$\rightarrow t \log \frac{249}{250} = \log 3 \rightarrow t = \frac{\log 3}{\log \frac{249}{250}} = \frac{\log 3}{\log 249 - \log 250} = \frac{\log 3}{2(\log 10 - \log 2) - (\log 3 + 3\log 10 - \log 2)}$

$= \frac{\log 3}{2(1 - 0.3) - (0.48 + 0.9)} = \frac{\log 3}{1.4 - 1.38} = \frac{0.48}{0.02} = 24$

روز

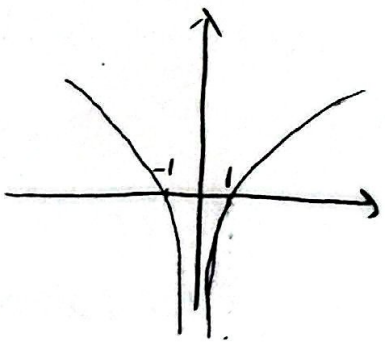
الف) $y = 9^{\log_3 x} = x^{\log_3 9} = x^2$

$D: x > 0$



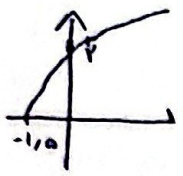
ب) $y = \log_{x^2} x$

$D: R - \{0\}$



۱

$y = 1 - \log_c^{(ax-b)}$ ، $b + c = -\frac{3}{2}$ ، $(a+c)b = (1+\frac{1}{2})(-2) = -3$ ← جواب



$\begin{cases} 1^{\circ}_{2} \longrightarrow 2 = 1 - \log_c^{-b} \longrightarrow \log_c^{-b} = -1 \rightarrow -b = c^{-1} \rightarrow -b = \frac{1}{c} \rightarrow -\frac{1}{c} + c = -\frac{3}{2} \\ \left[\begin{matrix} -\frac{3}{2} \\ 0 \end{matrix}\right] \longrightarrow 0 = 1 - \log_c^{-\frac{3}{2}a-b} \end{cases}$

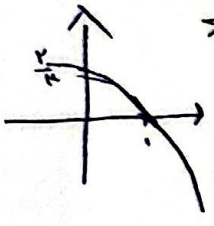
$\log_c^{-\frac{3}{2}a-b} = 1 \longrightarrow -\frac{3}{2}a - b = c$ ، $-b = \frac{1}{2}$ ، $c = -2$ ، $c = +\frac{1}{2}$ ← $2c^2 + 3c - 2 = 0$ ← $-2 + 2c^2 = -3c$

$-\frac{3}{2}a = b + c \rightarrow -\frac{3}{2}a = \frac{1}{2} \rightarrow a = -1$

۲

$f(x) = 1 + c \times 3^{ax+b}$ ، $f(-1) =$

★ ① $c \times 3^{a} \times 3^{b} = -1 \longrightarrow 3^{a} \times c = -\frac{1}{3}$



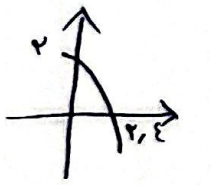
★ $\begin{cases} 1^{\prime}_{0} \longrightarrow 0 = 1 + c \times 3^{a+b} \rightarrow c \times 3^{a+b} = -1 \\ \left|\begin{matrix} 0 \\ \frac{2}{3} \end{matrix}\right. \longrightarrow \frac{2}{3} = 1 + c \times 3^{a} \rightarrow c \times 3^{a} = -\frac{1}{3} \end{cases}$ ⟹ $\frac{c \times 3^{a}}{c \times 3^{a+b}} = \frac{-\frac{1}{3}}{-1} = \frac{1}{3} \rightarrow \frac{1}{3^{b}} = \frac{1}{3}$

$b = 1$ ⟸

$f(-1) = 1 + c \times 3^{a-1} = 1 + c \times 3^{a} \times \frac{1}{3} \overset{①★}{\rightarrow} 1 + (-\frac{1}{3}) \times \frac{1}{3} = \frac{8}{9}$ ← جواب

۳

$y = c + \log_{\omega}^{(ax+b)}$ ، $\frac{a}{b} =$



$\begin{cases} 1^{\circ}_{2} \longrightarrow 2 = c + \log_{\omega}^{b} \rightarrow c = 2 - \log_{\omega}^{b} \\ 1^{\circ}_{2,4} \longrightarrow 0 = c + \log_{\omega}^{2,4a+b} \rightarrow c = -\log_{\omega}^{2,4a+b} \end{cases} \rightarrow 2 - \log_{\omega}^{b} = -\log_{\omega}^{2,4a+b}$

$\rightarrow 2 = \log_{\omega}^{b} - \log_{\omega}^{2,4a+b} \rightarrow 2 = \log_{\omega}^{\frac{b}{2,4a+b}} \rightarrow \frac{b}{2,4a+b} = 25 \rightarrow 9a - 25b = b \rightarrow 9a = 26b \rightarrow \frac{a}{b} = \frac{13}{9}$

جواب ↓

۴

$f(x) = \log_{\frac{1}{2}}^{(|x^2-2|-x)}$ $\rightarrow |x^2-2| - x > 0$

$\rightarrow$ $x > \sqrt{2} \rightarrow x^2 - 2 - x > 0 \rightarrow$ (+ | − | +) $\rightarrow (2, \infty)$

$x < \sqrt{2} \rightarrow -x^2 + 2 - x > 0 \rightarrow$ (− | + | −) $\rightarrow (-2, 1)$

$D = (-2, 1) \cup (2, \infty)$ ← جواب

۵

$f(x) = 2 + 2^{b-ax}$ ، $g(x) = -x^2 - 2x + 1$ ، $x = 1$ ، $f^{-1}(10) = -1$ ، $2b - a$

$\rightarrow 2 + 2^{b-ax} = -1 - 2 + 8 \rightarrow 2^{b-ax} = 2 \rightarrow b - ax = 1$

$f(1) = 10 \rightarrow 2 + 2^{b+a} = 10 \rightarrow 2^{b+a} = 8 \rightarrow b + a = 3$

$\left.\begin{matrix} b - ax = 1 \\ b + a = 3 \end{matrix}\right\} 2b = 4 \rightarrow b = 2, a = 1$

$\Rightarrow 2b - a = 4 - 1 = 3$ ← جواب