۶

$f(x) = -2 + \left(\frac{1}{2}\right)^{Ax+B}$, $y = x^2 - x \to x = 1, 2$ $\qquad f(3) = ?$

$\to x=1 : -2 + 2^{-(A+B)} = \underbrace{(1)^2 - 1}_{0} \to 2^{-(A+B)} = 2 : -(A+B) = 1 \to \boxed{A+B=-1}$

$\to x=2 : -2 + 2^{-(2A+B)} = \underbrace{(2)^2 - 2}_{2} \to 2^{-(2A+B)} = 4 : -(2A+B) = 2 \to \boxed{2A+B=-2}$

$\Rightarrow A=-1 , B=0$

$\Rightarrow f(x) = -2 + 2^x : f(3) = -2 + 2^3 = \underline{6}$

۷

پس از دو ساعت $\Rightarrow \frac{8}{9}$ برابر : $\cancel{m}\times\left(\frac{8}{9}\right)^t = \cancel{m}\times\frac{1}{6} \to t\underbrace{\log_5\frac{8}{9}}_{3\log_5 2 - 2\log_5 3} = \underbrace{-\log_5 6}_{-(\log_5 3 + \log_5 2)}$: $t\times\left(\frac{3\times5}{12} - \frac{2\times5}{7}\right) = -\left(\frac{5}{12}+\frac{5}{7}\right)$

$\log_2 5 = 2.4 = \frac{1}{\log_5 2} \Rightarrow \log_5 2 = \frac{5}{12}$

$\log_3 5 = 1.4 = \frac{1}{\log_5 3} \Rightarrow \log_5 3 = \frac{5}{7}$

$\Rightarrow t\times\left(\frac{35-40}{28}\right) = -\cancel{5}\times\left(\frac{7+12}{84}\right) \to t = \frac{19}{3}$ ساعت $\to \frac{19}{3}\times 60 = \underline{380}$ دقیقه

۸

$\Rightarrow$ هر هفته (۷ روز) $= \frac{7}{8}$ برابر : $\cancel{m}\times\left(\frac{7}{8}\right)^{\frac{t}{7}} = \cancel{m}\times\frac{1}{7} \to \frac{t}{7}\underbrace{\log_3\frac{7}{8}}_{\log_3 7 - \underbrace{\log_3 8}_{-3\log_3 2}} = -\log_3 7 \Rightarrow \frac{t}{7}\times\left(\frac{5}{3} - \frac{3\times5}{8}\right) = -\frac{5}{3}$

$\log_7 3 = 0.6 = \frac{1}{\log_3 7} \Rightarrow \log_3 7 = \frac{5}{3}$

$\log_2 3 = 1.6 = \frac{1}{\log_3 2} \Rightarrow \log_3 2 = \frac{5}{8}$

$\Rightarrow \frac{t}{7}\times\left(\frac{40-45}{24}\right) = -\frac{5}{3} \to \underline{t = 56}$ روز

۹

غلظت پس از یک روز $= \frac{100-4}{100} = \frac{96}{100} \Rightarrow 1\times\left(\frac{96}{100}\right)^t = \frac{1}{3}\times 1 \to t\left(\underbrace{\log\frac{96}{100}}\right) = -\log 3$

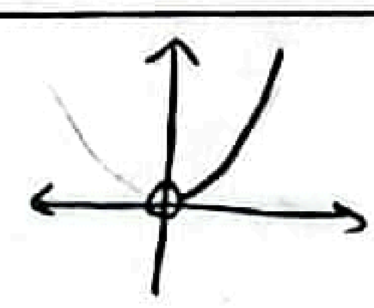
$\log 96 - 2 \;:\; 96 = 2^5\times 3 \to 5\log 2 + \log 3 - 2$

$\Rightarrow t\times(5\times0.3 + 0.48 - 2) = -0.48 \to -0.02\,t = -0.48 \to \underline{t = +24}$ روز

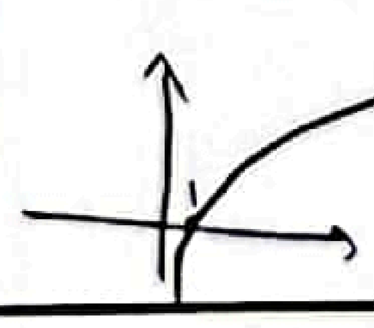
۱۰

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

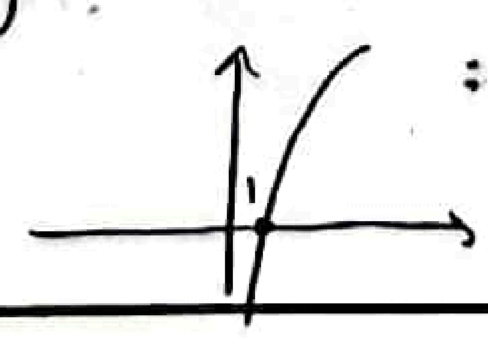
$\hookrightarrow D_f = (0, +\infty) \Rightarrow$



ب) $y = \log x^2 = 2\log x$



$: \log x \qquad \to \qquad : 2\log x$



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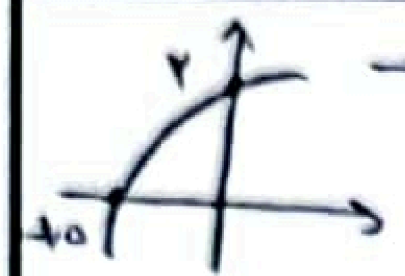


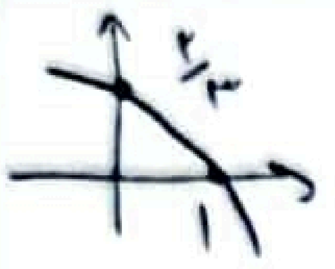
$y = 1 - \log_c^{ax-b}$, $b + c = -\frac{3}{2} \Rightarrow (a+c)b = ?$

$\to (0,2) : 1 - \log_c^{a(0)-b} = 2 \to -1 = \log_c^{-b} \to \underline{-b = \frac{1}{c}}$, $b + c = -\frac{3}{2}$

$\Rightarrow -\frac{1}{c} + c = -\frac{3}{2} : 2c^2 + 3c - 2 = 0 \longrightarrow \Delta = 9 + 16 = 25$, $c = \frac{-3 \pm 5}{4} \to c > 0 : \frac{-3+5}{4} = \underline{\frac{1}{2}}$, $\underline{b = \frac{-1}{2}}$

$\Rightarrow (-\frac{3}{2}, 0) : 1 - \log_{\frac{1}{2}}^{-\frac{3}{2}a + \frac{1}{2}} = 0 \to \frac{1}{2} = -\frac{3}{2}a + \frac{1}{2} \to \underline{a = 0}$: $(0 + \frac{1}{2}) \times \frac{-1}{2} = \underline{\frac{-1}{4}}$

۲



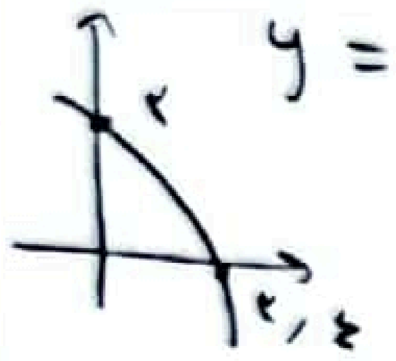
$f(x) = 1 + c \times 3^{a+bx} \to f(-1) = ?$

$\to (0, \frac{2}{3}) : 1 + c \times 3^a = \frac{2}{3} \longrightarrow c \times 3^a = -\frac{1}{3} = -1 \times 3^{-1} \longrightarrow \underline{a, c = -1}$

$\to (1, 0) : 1 - 3^{-1+b} = 0 \longrightarrow 3^{b-1} = 1 : b - 1 = 0 \to \underline{b = 1}$

$\to f(x) = 1 - 3^{x-1} : f(-1) = 1 - \underbrace{3^{-2}}_{\frac{-1}{9}} = \underline{\frac{8}{9}}$

۳



$y = c + \log_a^{ax+b} \to \frac{a}{b} = ?$

$\to (0,2) : c + \log_a^b = 2 \to c = 2 - \log_a^b$

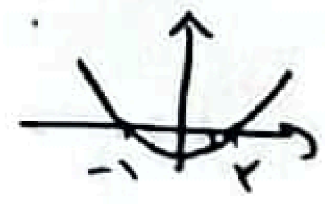
$\to (2.4, 0) : c + \log_a^{2.4a+b} = 0 \to c = -\log_a^{2.4a+b} \Rightarrow 2 = \log_a^b - \log_a^{2.4a+b}$

$\Rightarrow 2a = \frac{b}{2.4a+b} \to 20a = -24b \Rightarrow 5a = -2b : \frac{a}{b} = \underline{\frac{-2}{5}} = -0.4$

۴

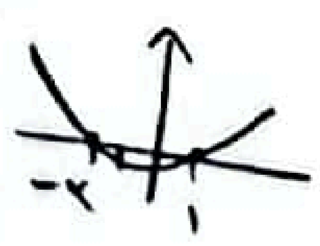
$f(x) = \log_4^{(|x^2-2| - x)} \to D_f = ? \to |x^2-2| - x > 0 \to |x^2-2| > x : x^2 - 2 > x$, $x^2 - 2 < -x$

$\Rightarrow 1)\ x^2 - x - 2 > 0 : x = -1, 2$:



$\to (-\infty, -1) \cup (2, +\infty)$

$\Rightarrow 2)\ x^2 + x - 2 < 0 : x = 1, -2$:



$\to (-2, 1)$

$1 \cap 2 \Rightarrow (-2, -1)$

۵

$f(x) = 2 + 2^{b-ax}$, $g(x) = -x^2 - 3x + 8 \to x = 1$, $f^{-1}(10) = -1 \to 2b - a = ?$

$\to x = 1 : 2 + 2^{b-a} = \underbrace{-(1)^2 - 3(1) + 8}_{-4} = 4 : 2^{b-a} = 2 \to \underline{b - a = 1}$

$\to f(-1) = 10 : 2 + 2^{b+a} = 10 \to 2^{b+a} = 2^3 : \underline{b + a = 3}$ $\Rightarrow 2b = 4 \to \underline{b = 2}$, $\underline{a = 1}$

$\Rightarrow 2b - a = 4 - 1 = \underline{3}$