

$$x=0 \rightarrow y=r \rightarrow \log^{-b}_c = -1 \rightarrow -b = \frac{1}{c}$$

$$x=-1/a \rightarrow y=0 \rightarrow \log^{-1/a a-b}_c = 1 \rightarrow c = -1/a a-b \rightarrow c+b = -\frac{r}{a}$$

$$\xrightarrow{c+b = -\frac{r}{a}} a=1, c = \frac{1}{c} = -\frac{r}{r} \rightarrow c = -r, \frac{1}{c} \rightarrow b = -r$$

$$\rightarrow (c+a)b = (\frac{1}{r} + 1) \cdot r = -r$$

$$x=1 \rightarrow y=0 \rightarrow c \times r^{a+b} = -1, x=0 \rightarrow y = \frac{r}{r} \rightarrow c \times r^a = -\frac{1}{r}$$

$$\rightarrow r^b = r \rightarrow f(-1) = 1 + c \times r^{a-b} = 1 + c \times r^a = r^b = 1 + (-\frac{1}{r} \times \frac{1}{r})$$

$$= 1 - \frac{1}{r} = \frac{r}{r}$$

$$c + \log^{r/a a+b}_a = 0$$

$$c + \log^b_a = r$$

$$\rightarrow \log^{r/a a+b}_a - \log^b_a = -r$$

$$\log \frac{r/a a+b}{b} = -r$$

$$\rightarrow \frac{r/a a+b}{b} = \frac{1}{r/a} \rightarrow r/a (\frac{a}{b}) = -r \rightarrow \frac{a}{b} = -\frac{r}{r/a}$$

$$|x^r - r| - x > 0 \rightarrow x \in (-\infty, -\sqrt{r}] \cup (r, +\infty) \textcircled{1} \rightarrow x^r - x - r > 0 \rightarrow x \in (-\infty, -1) \cup (r, +\infty) \textcircled{2}$$

$$\rightarrow \textcircled{1} \cap \textcircled{2} \rightarrow x \in (-\infty, -\sqrt{r}] \cup (r, +\infty) \textcircled{3}$$

$$x \in (-\sqrt{r}, \sqrt{r}) \textcircled{4} \rightarrow x^r + x - r < 0 \rightarrow x \in (-r, 1) \textcircled{5} \rightarrow \textcircled{4} \cap \textcircled{5} \rightarrow x \in (-\sqrt{r}, 1) \textcircled{6}$$

$$\rightarrow \textcircled{3} \cup \textcircled{6} \rightarrow x \in (-\infty, 1) \cup (r, +\infty) \checkmark$$

$$x=1 \rightarrow y=r \rightarrow r^{b-a} = r \rightarrow b-a=1$$

$$x=-1 \rightarrow y=0 \rightarrow r^{b+a} = r \rightarrow b+a=r$$

$$b=r, a=1 \checkmark$$

$$\rightarrow r b - a = r \checkmark$$

$$\left. \begin{aligned} x=1 \rightarrow y=0 &\rightarrow \left(\frac{1}{r}\right)^{A+B} = 0 \rightarrow A+B = -1 \\ x=r \rightarrow y=r &\rightarrow \left(\frac{1}{r}\right)^{rA+B} = r \rightarrow rA+B = -r \end{aligned} \right\} \rightarrow A = -1, B = 0$$

$$\rightarrow f(r) = -r + \frac{1}{r} = 4 \checkmark$$

٢
٤

$$M_r = M_1 \times \left(\frac{1}{9}\right)^t \rightarrow \frac{1}{9} M_1 = M_1 \times \left(\frac{1}{9}\right)^t = \frac{1}{9} = \left(\frac{1}{9}\right)^t$$

$$\log \frac{1}{9} = t \rightarrow \log \frac{9}{9} = t = \frac{\log 9}{\log 9} = \frac{\log 3 + \log 3}{\log 3} = \frac{\frac{0}{12} + \frac{0}{12}}{\frac{1}{12}} = \frac{0}{10}$$

$$= \frac{19}{12} h = 1.58 \text{ min} \checkmark$$

٢
٧

$$M_r = M_1 \times \left(\frac{1}{\lambda}\right)^t \rightarrow \frac{1}{\lambda} M_1 = M_1 \times \left(\frac{1}{\lambda}\right)^t \rightarrow \frac{1}{\lambda} = \left(\frac{1}{\lambda}\right)^t$$

$$\rightarrow \log \frac{1}{\lambda} = t = \frac{\log \frac{1}{\lambda}}{\log \frac{1}{\lambda}} = \frac{\frac{0}{10} - \frac{0}{10}}{\frac{1}{10}} = \frac{0}{10} = 1 \text{ ثانية} = 60 \text{ دقا} \checkmark$$

٢
٨

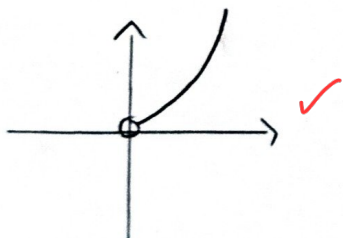
$$A_r = A_1 \times \left(\frac{94}{100}\right)^t \rightarrow \frac{1}{r} A_1 = A_1 \times \left(\frac{94}{100}\right)^t$$

$$\frac{1}{r} = \left(\frac{94}{100}\right)^t \rightarrow \log \frac{1}{r} = t = - \frac{1}{\log \frac{94}{100}}$$

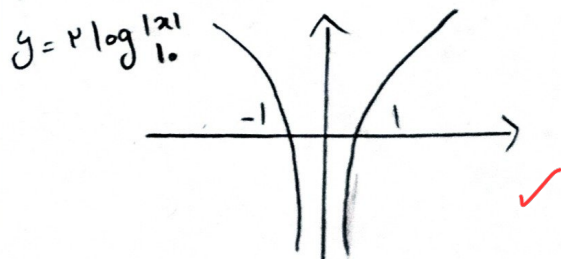
$$\log \frac{94}{100} = \frac{\log 94}{\log 100} - \frac{\log 100}{\log 100} = \frac{1.97}{1} - \frac{1.00}{1} = - \frac{1}{100} \rightarrow t = 100 \checkmark$$

٢
٩

الف) $y = 9 \log_r x \xrightarrow{x>0} y = x^r$



$y = \log_{10} x^r \rightarrow x^r > 0 \rightarrow x \in \mathbb{R} - \{0\}$



٢
١٠