

$$b = \log_{mn}^r + \log_{mn}^n = r \log_{mn}^m + \log_{mn}^n = \frac{r}{\underbrace{\log_m^m}_1 + \underbrace{\log_n^n}_{\frac{1}{a}}} + \frac{1}{\underbrace{\log_n^m}_a + \underbrace{\log_n^n}_1} = \frac{r}{\frac{a+1}{a}} + \frac{1}{a+1} = \frac{ra+1}{a+1}$$

$$a \rangle_0 \Rightarrow \langle \frac{a}{a+n} \rangle < 1 : n \in \mathbb{N}$$

الف) $\frac{x}{\log x} > 0 \Rightarrow \frac{x}{-\log x} > 0 \Rightarrow$

x	0	1
$\frac{x}{-\log x}$	$-\infty$	$+$
$-\log x$	$+$	$-\infty$
$\frac{x}{-\log x}$	$-\infty$	$+$

$\Rightarrow D = [0, 1)$

ب) $x^2 - x - 2 > 0$

$(x-2)(x+1) > 0$

$x \in (-\infty, -1) \cup (2, +\infty)$

①

$\sqrt{x^2-1} + 1 \neq 0$

$\Downarrow$

هو د. ب. م. م.

$\Downarrow$

$x \in \mathbb{R}$

②

$x^2 - 1 > 0$

$x^2 > 1$

$x \in (-\infty, -1) \cup (1, +\infty)$

③

$\Rightarrow D = \textcircled{1} \cap \textcircled{2} \cap \textcircled{3} = (-\infty, -1) \cup (2, +\infty)$

$$r \log_a^a + \log_a^{\sqrt{a}} = r \Rightarrow \log_a^a + \log_a^r - r = 0 \Rightarrow \log_a^a + \frac{1}{\log_a^a} - r = 0$$

$$\xrightarrow{\log_a^a = t} t + \frac{1}{t} - r = 0 \xrightarrow{+} t^2 + 1 - rt = 0 \Rightarrow (t-1)^2 = 0 \Rightarrow t = 1 \Rightarrow \log_a^a = 1 \Rightarrow \boxed{a=r}$$

$$\begin{aligned} & (\log 10 - \log 7) x^r + (\log 7) x - (\log 10 + \log 7) = 0 \\ & (\log 10 - \log 7 - \log 7) x^r + 2(\log 7) x - (\log 10 - \log 7 + \log 7) = 0 \\ & (1 - 0/7 - 0/7) x^r + 2(0/7) x - (1 - 0/7 + 0/7) = 0 \Rightarrow \frac{x}{10} x^r + \frac{1}{10} x - \frac{11}{10} = 0 \\ & \stackrel{|| \cdot 10}{\Rightarrow} x^r x^r + 1x - 11 = 0 \Rightarrow x_1 = 1 \\ & \quad \quad \quad a+b+c=0 \quad x_r = \frac{c}{a} = -\frac{11}{x} \Rightarrow x_1 - x_r = 1 - \left(-\frac{11}{x}\right) = \frac{x}{x} + \frac{11}{x} = \frac{1x}{x} \end{aligned}$$

$$\log_{1/r}^{10} = \log_{1/r}^r + \log_{1/r}^{\omega} = \frac{1}{\log_r^{1/r}} + \frac{1}{\log_r^{\omega}} = \frac{1}{\log_r^r + \log_r^r} + \frac{1}{\log_r^{\omega} + \log_r^{\omega}}$$

$$= \frac{1}{1+r/18} + \frac{1}{0.1\omega + 1/18} = \frac{10}{r/18} + \frac{10}{19} = \frac{\omega + 10}{19} = \boxed{\frac{10}{19}}$$

$$\therefore \log_{\omega}^r = \frac{\log_r^r}{\log_r^{\omega}} = \frac{r/18}{\frac{1}{\log_r^{10}}} = \frac{r/18}{0.1\omega} = \frac{r/18}{r} = 1/18$$

$$\log_{10}^r = \log_{10}^r + \log_{10}^r = \frac{1}{\log_{10}^r} + \frac{1}{\log_{10}^r} = \frac{1}{\log_{10}^r + \log_{10}^r} + \frac{1}{\log_{10}^r + \log_{10}^r}$$

$$= \frac{1}{1/4 + 1/4} + \frac{1}{1 + 1/4} = \frac{1}{1/2} + \frac{1}{5/4} = \frac{1}{1/2} + \frac{4}{5} = \frac{2}{1} + \frac{4}{5} = \frac{2+4}{1} = \frac{6}{1} = \boxed{\frac{6}{1}}$$

$$\therefore \log_{10}^r = \frac{\log_{10}^r}{\log_{10}^r} = \frac{1/4}{1/4} = \frac{1/4}{1/4} = \frac{1/4}{1/4} = \frac{1}{1} = 1$$

6

$$\log_{10}^r = m \Rightarrow \frac{1}{r} \log_{10}^r = m \Rightarrow \log_{10}^r + \log_{10}^r = rm \Rightarrow 1 + r \log_{10}^r = rm$$

$$\Rightarrow \log_{10}^r = \frac{rm-1}{r}$$

$$\log_{10}^r = \log_{10}^r + \log_{10}^r = 1 + \frac{1}{r} \log_{10}^r = 1 + \frac{rm-1}{r} = \frac{rm+r}{r} = \boxed{\frac{rm+r}{r}}$$

7

$$\left(\frac{r}{a}\right)^{rx-1} = \left(\left(\frac{a}{r}\right)^r\right)^{rx} \Rightarrow \left(\frac{a}{r}\right)^{1-rx} = \left(\frac{a}{r}\right)^{rxr} \Rightarrow 1-rx = rxr \Rightarrow rxr + rx - 1 = 0$$

$$\Rightarrow x_1 = -1 \quad \text{---} \quad \text{---} \quad \text{---} \quad (9x+1 > 0)$$

$$x_2 = -\frac{c}{a} = \frac{1}{r} \log_{10}^r \Rightarrow \log_{10}^{(rx+1)} = \frac{1}{r} \log_{10}^{(r+1)} = \frac{1}{r} \log_{10}^r = \boxed{\frac{1}{r}}$$

8

$$\log_{10}^b = \frac{1}{r} \log_{10}^b = \frac{1}{r} (1 + \log_{10}^r) \Rightarrow \log_{10}^b = r + r \log_{10}^r = \log_{10}^r + \log_{10}^r = \log_{10}^{2r}$$

$$\Rightarrow b = 2r \Rightarrow \log_{10}^{(rb-1)} = \log_{10}^{(10r-1)} = \log_{10}^{100} = \boxed{2}$$

9

$$\frac{1}{s} = \log_{10}^r \Rightarrow \frac{ra}{b} = r \log_{10}^r \Rightarrow \frac{ra}{b} = \log_{10}^r \Rightarrow \frac{a}{b} = \frac{\log_{10}^r}{r}$$

$$a = \frac{b+c}{r} \Rightarrow ra = b+c \Rightarrow b \times \log_{10}^r = b+c \Rightarrow \log_{10}^r = 1 + \frac{c}{b} \Rightarrow \frac{c}{b} = \log_{10}^r - 1$$

$$\frac{c}{a} = \frac{\frac{c}{b}}{\frac{a}{b}} = \frac{\log_{10}^r - 1}{\frac{1}{r} \log_{10}^r} = \frac{\log_{10}^r - \log_{10}^1}{\log_{10}^r} = \frac{\log_{10}^r - \log_{10}^1}{\log_{10}^r} = -\log_{10}^1 = -\log_{10}^1 = \log_{10}^1$$

$$\left(\frac{1}{\sqrt{r}}\right)^{\frac{c}{a}} = \left(r^{-\frac{1}{2}}\right)^{\log_{10}^1} = \left(\frac{1}{r}\right)^{\log_{10}^1} = \left(\frac{1}{r}\right)^{-\frac{1}{2}} \log_{10}^r = \left(\frac{1}{r}\right)^{-\frac{1}{2}} = r^{\frac{1}{2}} = \boxed{\sqrt{r}}$$

10