

$$\log_{mn} m^n = \log_{mn} mn + \log_{mn} m = b, \quad \log_m m^n = 1 + \frac{\log_m n}{a}$$

$$\log_{mn} m = \frac{1}{a+1} \rightarrow b = \left[1 + \frac{a}{a+1} \right] = \boxed{1}$$

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الف) $x > 0$ ① و $\log_{\frac{x}{x-1}} x \neq 0 \rightarrow x \neq 1$ و $\frac{x}{\log_{\frac{x}{x-1}} x} > 0$

$$\frac{0}{-} + \frac{1}{+} - \rightarrow \boxed{x \in (0, 1)}$$

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ب) $x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0 \rightarrow \frac{-1}{+} \frac{2}{-} \rightarrow x \in \mathbb{R} - [-1, 2]$ ①

$x^2 - 1 \geq 0 \rightarrow x^2 \geq 1 \rightarrow x \in \mathbb{R} - (-1, 1)$ ②

$\hookrightarrow \boxed{\text{①} \cap \text{②} = x \in \mathbb{R} - [-1, 2]}$

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$$r \log_a a = \frac{1}{\log_a \sqrt{x}} \rightarrow \log_a \sqrt{x} = r \rightarrow t + \frac{1}{t} = r$$

$$\frac{t^2 - rt + 1}{t} = 0 \rightarrow t = 1 \rightarrow \log_a \sqrt{a} = 1 \rightarrow \boxed{a = 3}$$

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$$\log^1 10 - \log^2 7 = \log^a a \rightarrow \log^a a = 0/1 \rightarrow \log^{\frac{a}{r}} a = 0/3$$

$$\log^9 a = 0/1 \text{ و } \log^{15} a = 1/1 \rightarrow 0/3 x^2 + 0/1 x - 1/1 = 0$$

$$3x^2 + 1x - 11 = 0 \rightarrow x^2 + 1x - 33 = 0 \rightarrow (x+11)(x-3) = 0$$

$$x = \begin{cases} -11 \\ 3 \end{cases} \rightarrow \boxed{\frac{14}{3}}$$

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$$\log_a^r a \times \log_a^v a = \log_a^v a \rightarrow \log_a^v a = 1/2 \rightarrow \frac{\log_a^{10} a}{\log_a^{14} a} = \frac{1 + \log_a^4 a}{0/a + \frac{\log_a^4 a}{1/2}}$$

$$\frac{1/5}{1/9} = \boxed{\frac{15}{19}}$$

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$$\log_{mn} m^n = \log_{mn} mn + \log_{mn} m = b, \quad \log_{\frac{m}{a}} m^n = 1 + \log_{\frac{m}{a}} m$$

$$\log_{mn} m = \frac{1}{a+1} \rightarrow b = \left[1 + \frac{a}{a+1} \right] = \boxed{1}$$

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الف) $x > 0$ ① و $\log_{\frac{x}{x}} \neq 0 \rightarrow x \neq 1$ و $\frac{x}{\log \frac{x}{x}} > 0$

$$\frac{0}{-1+1} \rightarrow \boxed{x \in (0, 1)}$$

ب) $x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0 \rightarrow x < -1$ ②
 $x^2 - 1 > 0 \rightarrow x^2 > 1 \rightarrow x \in \mathbb{R} - (-1, 1)$ ③

$$\hookrightarrow \boxed{\text{①} \cap \text{②} = x \in \mathbb{R} - [-1, 2]}$$

$$r \log_a a = \frac{1}{\log_{\sqrt{a}} a} \rightarrow \log_{\sqrt{a}} a = r \rightarrow t + \frac{1}{t} = r$$

$$\frac{t^2 - rt + 1}{t} = 0 \rightarrow t = 1 \rightarrow \log_{\sqrt{a}} a = 1 \rightarrow \boxed{a = 3}$$

$$\log^1 10 - \log^1 7 = \log^a a \rightarrow \log^a a = 0/1 \rightarrow \log^{\frac{a}{3}} a = 0/3$$

$$\log^1 9 = 0/1 \text{ و } \log^{1/a} a = 1/1 \rightarrow 0/3 x^r + 0/1 x - 1/1 = 0$$

$$3x^r + 1x - 11 = 0 \rightarrow x^r + 1x - 33 = 0 \rightarrow (x+11)(x-3) = 0$$

$$x = \left. \begin{matrix} -11 \\ 3 \end{matrix} \right\} \rightarrow \boxed{\frac{14}{3}}$$

$$\log_{\Delta}^r \Delta \times \log_{\Delta}^v \Delta = \log_{\Delta}^v \Delta \rightarrow \log_{\Delta}^v \Delta = 1/4 \rightarrow \frac{\log_{\Delta}^{1/4} \Delta}{\log_{\Delta}^{1/4} \Delta} = \frac{1 + \log_{\Delta}^{\mu} \Delta}{0/5 + \frac{\log_{\Delta}^v \Delta}{1/4}}$$

$$\frac{1/5}{1/9} = \boxed{\frac{15}{19}}$$