

$$\log_{mn}^{mn} = \log_{mn}^m + \log_{mn}^n = r \log_{mn}^m + \log_{mn}^n = \frac{r}{\log_{mn}^m} + \frac{1}{\log_{mn}^n} = \frac{r}{\log_{m+1}^n} + \frac{1}{\log_{n+1}^m}$$

$$\log_{n+1}^a = \frac{r}{\frac{1}{a+1}} + \frac{1}{a+1} = \frac{r}{\frac{1}{a+1}} + \frac{1}{a+1} = \frac{r(a+1)}{a+1} = b = \frac{r(a+1)-1}{a+1} = r - \frac{1}{a+1}$$

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الف) $A = \frac{x}{\log_{\frac{1}{x}}^x} \geq 0$

$\log_{\frac{1}{x}}^x = 0 \rightarrow x = 1$

$\log_{\frac{1}{x}}^x \neq 0 \rightarrow x \neq 1, x > 0$

x	-	0	1	+
$\log_{\frac{1}{x}}^x$	+	0	-	+
A	-	0	+	-

مجموعه جواب: $(0, 1)$

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ب) $\log_{\frac{x^2-x-2}{x}}^{x^2-x-2} \rightarrow x^2-x-2 > 0 \rightarrow (x-2)(x+1) > 0 \rightarrow x < -1 \text{ or } x > 2$

$\sqrt{x^2-1} \rightarrow x^2-1 > 0 \rightarrow (x-1)(x+1) > 0 \rightarrow x < -1 \text{ or } x > 1$

مجموعه جواب: $(-\infty, -1) \cup (2, +\infty)$

$$r \log_a^a + \log_a^{\sqrt{a}} = r = r \log_{\frac{r}{r}}^a + \log_a^r = \frac{r}{r} \log_{\frac{r}{r}}^a + \log_a^r = r$$

$$\rightarrow = \log_{\frac{r}{r}}^a + \frac{1}{\log_{\frac{r}{r}}^a} = r \rightarrow A + \frac{1}{A} = r \Rightarrow A^2 + 1 = rA \rightarrow A^2 - rA + 1 = 0$$

$$\rightarrow (A-1)^2 = 0 \rightarrow A = 1 = \log_{\frac{r}{r}}^a \rightarrow a = r$$

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$$\log_{\frac{1}{10}}^{\frac{1}{10}} = \log_{\frac{1}{10}}^{\frac{1}{10}} - \log_{\frac{1}{10}}^{\frac{1}{10}} = \log_{\frac{1}{10}}^{\frac{1}{10}} - \log_{\frac{1}{10}}^{\frac{1}{10}} = \log_{\frac{1}{10}}^{\frac{1}{10}} - \log_{\frac{1}{10}}^{\frac{1}{10}} = 1 - 0,4 - 0,4 = 0,2$$

$$\log_{\frac{1}{10}}^{\frac{1}{10}} = \log_{\frac{1}{10}}^{\frac{1}{10}} + \log_{\frac{1}{10}}^{\frac{1}{10}} = \log_{\frac{1}{10}}^{\frac{1}{10}} + \log_{\frac{1}{10}}^{\frac{1}{10}} = \log_{\frac{1}{10}}^{\frac{1}{10}} - \log_{\frac{1}{10}}^{\frac{1}{10}} + \log_{\frac{1}{10}}^{\frac{1}{10}} = 1 - 0,4 + 0,4 = 1,1$$

$$\log_{\frac{1}{10}}^{\frac{1}{10}} = r \log_{\frac{1}{10}}^{\frac{1}{10}} = r \times 0,4 = 0,4$$

$$\rightarrow \frac{r}{10} x^2 + \frac{1}{10} x - \frac{11}{10} = 0 \rightarrow 10x^2 + x - 11 = 0 \rightarrow x^2 + 11x - 11 = (x+11)(x-1) = 0$$

$$\Rightarrow x = \frac{r}{10} = 1, x = -\frac{11}{r} \rightarrow \text{اصناف: } 1 - (-\frac{11}{r}) = 1 + \frac{11}{r} = \frac{16}{r}$$

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$$\log_{\frac{1}{10}}^{\frac{1}{10}} = \frac{\log_{\frac{1}{10}}^{\frac{1}{10}}}{\log_{\frac{1}{10}}^{\frac{1}{10}}} = \frac{\log_{\frac{1}{10}}^{\frac{1}{10}} + \log_{\frac{1}{10}}^{\frac{1}{10}}}{\log_{\frac{1}{10}}^{\frac{1}{10}} + \log_{\frac{1}{10}}^{\frac{1}{10}}} = \frac{1 + \log_{\frac{1}{10}}^{\frac{1}{10}}}{1 + \log_{\frac{1}{10}}^{\frac{1}{10}}} = \frac{1+r}{1+r,4} = \frac{r}{r,4} = \frac{r}{\frac{4}{10}} = \frac{10}{4}$$

$$\log_{\frac{1}{10}}^{\frac{1}{10}} = \frac{1}{\log_{\frac{1}{10}}^{\frac{1}{10}}} = \frac{1}{0,4} = \frac{10}{4} = r$$

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$$\log_{10}^4 = \frac{\log_r^4}{\log_r 10} = \frac{\log_r^3 + \log_r^1}{\log_r^3 + \log_r^2} = \frac{1 + \frac{1}{r}}{1 + \frac{1}{r}} = \frac{\frac{1+r}{r}}{\frac{1+r}{r}} = \frac{1+r}{r} = \frac{1}{r} = \frac{1}{r_0}$$

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$$\log_r^r = \frac{1}{\log_r^r} = \frac{1}{1/4} = \frac{1}{1/4} = \frac{4}{1} = 4$$

$$\log_r^m = \log_r^q + \log_r^r = \frac{1}{r} \log_r^r + \frac{1}{r} \log_r^r = \frac{1}{r} \log_r^r + \frac{1}{r} = m \rightarrow \log_r^r = \frac{r}{r} (m - \frac{1}{r})$$

$$\rightarrow \log_r^r = \frac{r}{r} (m - \frac{1}{r}) = \frac{r(m-1)}{r}$$

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$$\log_r^r = \log_r^r + \log_r^r = 1 + \log_r^r = 1 + \frac{1}{r} \log_r^r = 1 + \frac{1}{r} \times \frac{r(m-1)}{r} = 1 + \frac{r(m-1)}{r}$$

$$= \frac{r + r(m-1)}{r} = \frac{rm}{r}$$

$$(0, r)^{r-1} = (\frac{r}{\omega})^{r-1}, (\frac{1}{r})^r = (\frac{1}{r})^r = (\frac{1}{r})^r \Rightarrow (0, r)^{r-1} = (\frac{1}{r})^{1-r}$$

$$(\frac{1}{r})^{1-r} = (\frac{1}{r})^{1-r} \rightarrow r^{1-r} = 1 - r \rightarrow r^{1-r} + r - 1 = 0 \rightarrow r^{1-r} + r - 1 = (r+1)(r-1)$$

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

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$$\log_r^{(-1+1)} \rightarrow \text{تعريف نسبه}$$

$$\log_r^{(1+\frac{1}{r}+1)} = \log_r^r = \frac{r}{r} \log_r^r = \frac{r}{r}$$

$$\log_r^b = \frac{1}{r} \log_r^b = \frac{r}{r} (1+a) \rightarrow \log_r^b = r(1+a) = r(1 + \log_r^r) = r(\log_r^1 + \log_r^r)$$

$$= r(\log_r^1) = \log_r^r = \log_r^b \rightarrow b = r$$

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$$\rightarrow r^b - 1 = r^r - 1 = 1 - 1 = 0 \rightarrow \log_r^{100} = r$$

$$\log_{\frac{1}{r}}^{\frac{1}{a}} = \frac{1}{s} = \frac{1}{-\frac{1}{b}} = \frac{r}{b} = \log_r^r = r \log_r^r + \frac{r}{b} = \log_r^r \Rightarrow \frac{1}{b} = \frac{\log_r^r}{r}$$

$$\rightarrow \frac{1}{b} = \frac{r}{\log_r^r} = r \log_r^r$$

$$a = \frac{c+b}{r} \Rightarrow ra = c+b \xrightarrow{\div a} r = \frac{c}{a} + \frac{b}{a} = \frac{c}{a} + r \log_r^r \rightarrow \frac{c}{a} = r - r \log_r^r = r(1 - \log_r^r)$$

$$= r(1 - \log_r^r - \log_r^r) = -r \log_r^r \rightarrow \frac{1}{\sqrt{r}} = (\frac{1}{r})^{\frac{1}{a}} = r^{-\frac{1}{a}} \rightarrow (r^{-\frac{1}{a}})^{\frac{c}{a}} = r^{\frac{r \log_r^r}{a}}$$

$$= r^{\frac{\log_r^r}{r}} = (r^{\log_r^r})^{\frac{1}{r}} = (\log_r^r)^{\frac{1}{r}} = (\log_r^r)^{\frac{1}{r}} = \sqrt[r]{\log_r^r}$$