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$$\log_n^m = a, \log_{mn}^{m^2n}, a > 0, [b] = ?$$

$$m = n^a \rightarrow \log_{mn}^{m^2n} = \log_n^{n^{2a+1}} \Rightarrow \frac{2a+1}{a+1} = b = \frac{a+1}{a+1} + \frac{a}{a+1} = 1 + \frac{a}{a+1}$$

$$a > 0 \rightarrow 0 < \frac{a}{a+1} < 1 \Rightarrow [b] = 1$$

$$(الف) y = \sqrt{\frac{x}{\log \frac{x}{\frac{1}{x}}}} \rightarrow \textcircled{1} \frac{x}{\log \frac{x}{\frac{1}{x}}} \geq 0 \rightarrow \frac{0}{0} + \frac{1}{0} -$$

$$\rightarrow \textcircled{2} x > 0 \quad \textcircled{2} \cap \textcircled{1} \rightarrow D_y = (0, +\infty)$$

$$(ب) y = \frac{\log(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1} \rightarrow \textcircled{1} x^2 - x - 2 > 0 \rightarrow \frac{-1}{+} \frac{2}{-} \frac{+}{+}$$

$$\rightarrow \textcircled{2} x^2 - 1 \geq 0 \rightarrow x^2 \geq 1 \rightarrow x \geq 1 \cup x \leq -1$$

$$\rightarrow \textcircled{3} \sqrt{x^2 - 1} + 1 = 0 \xrightarrow{\text{همه وقت منفی شود!}} \textcircled{1} \cap \textcircled{2} \Rightarrow D_y = (-\infty, -1) \cup (1, +\infty)$$

$$2 \log_a^3 + \log_a^3 = 2 \Rightarrow \log_a^3 + \frac{1}{\log_a^3} - 2 = 0 \Rightarrow \log_a^3 = t$$

$$t + \frac{1}{t} - 2 = 0 \xrightarrow{\times t} t^2 - 2t + 1 = 0 \rightarrow (t-1)^2 = 0 \rightarrow t = 1 \rightarrow \log_a^3 = t \rightarrow a = 3$$

$$\log 9 = 2 \log 3, \log 15 = \log 3 + \log 5 \quad (\log 5 = \log 10 - \log 2 = 1 - \log 2)$$

$$\log 15 \approx 0,4 + 0,7 \approx 1,1$$

$$\log \frac{a}{3} = \log 5 - \log 3 = 0,7 - 0,4 \approx 0,3 \rightarrow 0,3 x^2 + 0,1 x - 1,1 = 0 \quad (a+b+c=0)$$

$$\rightarrow x = \frac{-11}{3} \text{ و } 1 \rightarrow \text{مجموع} = 1 - \left(-\frac{11}{3}\right) = \frac{14}{3}$$

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$$\log_{1/4}^1 = \frac{\log_{1/4}^1}{\log_{1/4}^1} = \frac{\log_2^1 + \log_2^1}{\log_2^1 + \log_2^1} \Rightarrow \log_{1/4}^1 = \frac{1+1}{1+1} = \frac{2}{2} = 1 \quad (a)$$

$$\log_{1/8}^2 = \frac{\log_{1/8}^2}{\log_{1/8}^2} = \frac{\log_2^2 + \log_2^2}{\log_2^2 + \log_2^2} \Rightarrow \frac{1 + \frac{1}{2}}{1 + \frac{1}{2}} = \frac{1 \frac{1}{2}}{1 \frac{1}{2}} = 1 \quad (c)$$

$$\log_{1/4}^{12} = \log_{1/4}^4 + \log_{1/4}^8 = 1 + \log_{1/4}^8 \quad / \quad m = \log_{1/4}^{12} = \frac{\log_2^{12}}{\log_2^4} \quad (b)$$

$$\rightarrow \frac{\log_2^4 + \log_2^8}{\log_2^4 + \log_2^8} \rightarrow m = \frac{\frac{1}{4} + 2 \log_2^8}{\frac{1}{4} + 1} \rightarrow \frac{1}{4} m = \frac{1}{4} + 2 \log_2^8 \rightarrow \frac{m-1}{4} = 2 \log_2^8$$

$$\log_{1/4}^{12} = 1 + \frac{m-1}{4} \rightarrow \frac{m}{4} (m+1)$$

$$\left(\frac{12}{4}\right)^{x^2} = \left(\frac{12}{4}\right)^{x^2} = \left(\frac{3}{1}\right)^{-3x^2} = (0.33)^{-3x^2} \rightarrow -3x^2 = 2x-1 \rightarrow 3x^2 + 2x - 1 = 0 \quad (a)$$

$$\rightarrow (x+1)(x-\frac{1}{3}) \rightarrow x = -1, x = \frac{1}{3} \rightarrow \log_{1/4}^{9 \times \frac{1}{3} + 1} = \log_{1/4}^4 = \frac{1}{4} \log_{1/4}^4 = \frac{1}{4} \quad (c)$$

$$\log_{1/4}^b = \frac{1}{4} (1 + \log_{1/4}^3) = \frac{1}{4} (\log_{1/4}^2 + \log_{1/4}^3) = \frac{1}{4} \log_{1/4}^6 = \log_{1/4}^{3/2} \quad (a)$$

$$\rightarrow b = 3/2 \rightarrow \log_{1/4}^{(3/2 \times 3/2) - 1} = \log_{1/4}^{1/2} = 1/2 \quad (b)$$

$$\frac{f_a}{b} = 2 \log_2^2 \rightarrow \frac{f_a}{b} = \log_2^2 \rightarrow b = \frac{f_a}{\log_2^2} \quad \text{و} \quad \frac{b+c}{2} = a \rightarrow c = 2a - b \quad (1)$$

$$\frac{c}{a} = \frac{2a-b}{a} = \frac{2-b}{a} = 2 - \left(\frac{f_a}{\log_2^2} \times \frac{1}{a}\right) = 2 - \frac{f_a}{\log_2^2} = 2 \left(1 - \frac{1}{\log_{1/4}^2}\right)$$

$$= 2 - 2 \log_{1/4}^2 = 2 - \log_{1/4}^4 \rightarrow \frac{1}{\sqrt{r}} = \left(2^{-\frac{1}{2}}\right)^{2-2 \log_{1/4}^2} = \left(2^{-\frac{1}{2}}\right)^{2(1-\log_{1/4}^2)}$$

$$= 2^{-\frac{1}{2} \log_{1/4}^2} = 2^{-\log_{1/4}^2} \rightarrow \omega \log_{1/4}^2 \rightarrow \omega^{\frac{1}{2} \log_{1/4}^2} \rightarrow \sqrt{\omega}$$