

$$\log(r-x) \Rightarrow r-x > 0 \Rightarrow x < r$$

$$\log(r-x) - \log \frac{1}{(x-r)r} = \log \frac{r-x}{(x-r)r} = \log(r-x)^r = r^r$$

$$\Rightarrow 10^r = (r-x)^r \Rightarrow x = -1 \quad \checkmark$$

$$\log_{r^r} 1 = r \times r = 4 \quad \checkmark$$

(r)

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$$r^{x^r-r} = 1/x \rightarrow r^{x^r-r} = r^{rx} \Rightarrow x^r - rx - r = 0 \rightarrow x = \frac{r \pm \sqrt{r^2}}{r}$$

$$\log_{\frac{1}{4}}(x-r) \Rightarrow x-r > 0 \Rightarrow x = \frac{r + r\sqrt{4}}{r} = r + \sqrt{4} \quad \checkmark$$

$$\log_{\frac{1}{4}}(r + \sqrt{4} - r) = \log_{\frac{1}{4}} 4 = \frac{1}{r} \quad \checkmark$$

(r)

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$$\log_{\frac{1}{11}} 1 = \log_{\frac{1}{11}}^r + \log_{\frac{1}{11}}^r + \log_{\frac{1}{11}}^r = r \times \left(\frac{\log_r 1}{\log_r 11} \right) = r \times \left(\frac{\frac{\Delta}{r}}{\log_r 11} \right) = \frac{r \Delta}{r \log_r 11} = \frac{\Delta}{\log_r 11}$$

$$\rightarrow \frac{\Delta}{V} \quad \checkmark$$

(r)

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$$\log_{\frac{1}{11}} 4 = \log_{\frac{1}{11}}^r + \log_{\frac{1}{11}}^r = \frac{\log_{\frac{1}{11}}^r}{\log_{\frac{1}{11}}^r} + \frac{\log_{\frac{1}{11}}^r}{\log_{\frac{1}{11}}^r} = \frac{0/1 + 0/\Delta}{\log_{\frac{1}{11}}^r + \log_{\frac{1}{11}}^r} = \frac{1/r}{1 + 0/11}$$

$$\rightarrow \frac{1/r}{11} \quad \checkmark$$

(r)

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$$x = -1 \Rightarrow \log_r a - a + \log_r b = 0 \Rightarrow \log_r(a+b) = a \Rightarrow 10^a = r^{a+b}$$

$$r^a \times \Delta^a = r^{a+b} \Rightarrow \Delta^a = \frac{r^{a+b}}{r^a} = r^b \Rightarrow b = \log_r \Delta^a \Rightarrow \frac{b}{a} = \log_r \Delta \quad \checkmark$$

$$\Rightarrow (\sqrt{r})^{\frac{b}{a}} = r^{\left(\frac{1}{r}\right)^{\frac{b}{a}}} = r^{\left(\frac{1}{r}\right)(\log_r \Delta)} = r^{\frac{1}{r}} = \sqrt[r]{r} \quad \checkmark$$

(1/VA)

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