

q.3 Laws of Logs

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Condensed Form

vs.

Expanded Form

$$1. \log(AB) = \log A + \log B$$



$$2. \log\left(\frac{A}{B}\right) = \log A - \log B$$

$$3. \log A^B = B \log A$$

$$x^2 \cdot x^3 = x^{2+3}$$

$$\frac{x^5}{x^2} = x^{5-2}$$

$$(x^2)^3 = x^{2 \cdot 3}$$

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Condense

$$\log_3 12 + \frac{1}{2} \log_3 7 - \log_3 2 \quad \text{SAME BASE}$$

$$\log_3 12 + \log_3 \sqrt{7} - \log_3 2$$

$$\log_3 (12\sqrt{7}) - \log_3 2$$

$$\log_3 \left(\frac{12\sqrt{7}}{2} \right) = \boxed{\log_3 (6\sqrt{7})}$$

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Expand

$$\ln\left(\frac{ab}{\sqrt[3]{c}(d+1)}\right)$$

$$\ln(ab) - \ln(\sqrt[3]{c}(d+1))$$

$$\ln a + \ln b - (\ln(\sqrt[3]{c}(d+1)))$$

$$\ln a + \ln b - \ln \sqrt[3]{c} - \ln(d+1)$$

$$\boxed{\ln a + \ln b - \frac{1}{3}\ln c - \ln(d+1)}$$

$$\sqrt[3]{c} = c^{\frac{1}{3}}$$

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Change of Base...

$$\log_B x = \frac{\log x}{\log B} = \frac{\ln x}{\ln B}$$

(ex) $\log_2 5 = \frac{\log 5}{\log 2}$

ALPHA WINDOW

The image shows the TI-Nspire CX CAS calculator's ALPHA menu. The menu items are: 1: abs(), 2: Σ(), 3: nDeriv(), 4: fnInt(), and 5: logBASE(). A green arrow points from the text above to the 'logBASE()' option. Below the menu, the function $\log_2(5)$ is entered in the command line, and the result 2.321928095 is displayed.

1: abs()
2: Σ()
3: nDeriv()
4: fnInt()
5: logBASE() ←

[FRAC] [FUNC] [MTRX] [Y-VAR]

$\log_2(5)$
2.321928095