LOG PROPERTIES

1. $\log M + \log N = \log(MN)$

2. $\log M - \log N = \log \frac{M}{N}$

3. $P \log M = \log M^P$

7. $\ln \frac{x^2 y^3}{z^8}$

$\ln(x^2 y^3) - \ln z^8$

$\ln x^2 + \ln y^3 - \ln z^8$

$\boxed{2\ln x + 3\ln y - 8\ln z}$

8. $\ln \sqrt[4]{\frac{x^2}{x-3}}$

$\ln \left(\frac{x^2}{x-3}\right)^{\frac{1}{4}}$

$\frac{1}{4}\ln \left(\frac{x^2}{x-3}\right)$

$\frac{1}{4}\ln x^2 - \frac{1}{4}\ln(x-3)$

$\frac{2}{4}\ln x - \frac{1}{4}\ln(x-3)$

$\boxed{\frac{1}{2}\ln x - \frac{1}{4}\ln(x-3)}$

9. $\ln \frac{4x(x-5)}{(x+1)^3}$

$\ln[4x(x-5)] - \ln(x+1)^3$

$\boxed{\ln 4 + \ln x + \ln(x-5) - 3\ln(x+1)}$

10. $\ln(5x-1) - \ln(7x+8)$

$\boxed{\ln \frac{5x-1}{7x+8}}$

11.

$5\ln(x+3) - 2\ln(3x) + 4\ln(x-7)$

$\ln(x+3)^5 - \ln(3x)^2 + \ln(x-7)^4$

$\ln \frac{(x+3)^5}{(3x)^2} + \ln(x-7)^4$

$\boxed{\ln \frac{(x+3)^5 (x-7)^4}{9x^2}}$

12.

$\frac{1}{3}[2\ln(x-1) + \ln(x-7)] - 3\ln(x+8)$

$\frac{1}{3}[\ln(x-1)^2 + \ln(x-7)] - \ln(x+8)^3$

$\frac{1}{3}\ln[(x-1)^2(x-7)] - \ln(x+8)^3$

$\ln[(x-1)^2(x-7)]^{\frac{1}{3}} - \ln(x+8)^3$

$\boxed{\ln \frac{\sqrt[3]{(x-1)^2(x-7)}}{(x+8)^3}}$