E.g. Expand $\ln\left(\frac{\sqrt{(x-1)(2x+1)^2}}{x^2-9}\right)$

Quotient Rule

$\stackrel{?}{=} \ln\left(\sqrt{(x-1)(2x+1)^2}\right) - \ln\left(\sqrt{x^2-9}\right)$

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

Product Rule

$= \frac{1}{2}\ln(x-1) + \frac{1}{2}\cdot\ln(2x+1)^{2} - \ln(x+3) - \ln(x-3)$

$= \frac{1}{2}\ln(x-1) + \ln(2x+1) - \ln(x+3) - \ln(x-3).$

Nov 22-10:34 AM

Condense Log Expressions

E.g. $\log_3(x) + \log_3(x+5) \xrightarrow{\text{condense}}$

By product Rule.

$\log_3(x) + \log_3(x+5) = \log_3\left(x(x+5)\right)$

E.g. $\log_3(5) + \log_3(8) - \log_3(2) \longrightarrow$ condense

$= \log_3\left(\frac{5\cdot 8}{2}\right) = \log_3\left(\frac{40}{2}\right) = \log_3(20)$

E.g. $\log(3) - \log(4) + \log(5) - \log(6) + \log(7)$

$= \log\left(\frac{3\cdot 5\cdot 7}{4\cdot 6}\right) = \log\left(\frac{35}{8}\right).$

Nov 22-10:46 AM

E.g. $\log_2(x^2) + \frac{1}{2}\log_2(x-1) - 3\log_2\left((x+3)^2\right) \longrightarrow$ condense.

$= \log_2(x^2) + \log_2\sqrt{x-1} - \log_2(x+3)^6$

$= \log_2\left(\frac{x^2\cdot\sqrt{x-1}}{(x+3)^6}\right)$

Change of base formula

$$\boxed{\log_b(M) = \frac{\log_c(M)}{\log_c(b)}}$$

Nov 22-10:50 AM

$\log_b(M) = \frac{\log_c(M)}{\log_c(b)}$

Multiply $\log_c(b)$ to both sides

$\log_c(b)\log_b(M) = \log_c(M)$

Nov 22-11:10 AM