Key Log Quiz MODULE 13

✓ ① Write the following expression as a single logarithm:

$$3\log_5(x+1) + 5\log_5(x-1) - \tfrac{1}{2}\log_5(x+3)$$

$\log_5(x+1)^3 + \log_5(x-1)^5 - \log_5(x+3)^{\frac{1}{2}}$

$= \log_5\left[\dfrac{(x+1)^3(x-1)^5}{\sqrt{x+3}}\right]$

✓ ② Write as sum/difference of multiples of logarithms: $\log_4\left(\dfrac{2y^4\sqrt[5]{x^2+1}}{(3x-2)^2}\right)$

$\log_4 2 + \log_4 y^4 + \log_4 (x^2+1)^{\frac{1}{5}} - \log_4 (3x-2)^2$

$\frac{1}{2} + 4\log_4 y + \frac{1}{5}\log_4(x^2+1) - 2\log_4(3x-2)$

✓ ③ Write as a sum/difference of mulitiples of logarithms. Each logarithm should be as simple as possible.

$\ln\left(\dfrac{e^{x^2}\sqrt[3]{(x+1)^2}}{z^2}\right)$

$\ln e^{x^2} + \ln(x+1)^{2/3} - \ln z^2$

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

④ Evaluate each expression without using a calculator.

✓ a) $2\log_4\left(\dfrac{1}{16}\right) = 2\log_4 4^{-2}$

$= -4$

✓ b) $\log_3(9^5)$

$= \log_3 3^{10}$

$= 10$

✓ ⑤ Without using a calculator, evaluate the expression: $\frac{5}{2}\log_2 8 - \log_{25}\left(\frac{1}{5}\right) + \log_{\frac{1}{3}} 9$.

$\log_2(2^3)^{5/2} - \log_{25} 25^{-\frac{1}{2}} + \log_{\frac{1}{3}}\left(\frac{1}{3}\right)^{-2}$

$= 15/2 - -\frac{1}{2} - 2 = 6$

✓ ⑥ Solve $3^{x+1} = 5^x$. (Give exact answer)

$(3^x)3 = 5^x$

$3 = \dfrac{5^x}{3^x}$

$3 = \left(\dfrac{5}{3}\right)^x$

$\log_{\left(\frac{5}{3}\right)} 3 = x$