Name: Answers Date: _____

Homework: Properties of Logarithms **Honors PreCalculus**

Textbook Pages 308-309 Problems *43-55 odd, 61-67 odd*

43) $\ln \frac{x}{e^x} \rightarrow \ln x - x \underbrace{\ln e}_{1}$

$\boxed{\ln x - x}$

45) $\log_a (u^2 v^3) \rightarrow \boxed{2\log_a u + 3\log_a v}$

47) $\ln (x^2\sqrt{1-x}) \rightarrow \boxed{2\ln x + \frac{1}{2}\ln(1-x)}$

49) $\log_2 \left(\frac{x^3}{x-3}\right) \rightarrow \boxed{3\log_2 x - \log_2 (x-3)}$

51) $\log \left[\frac{x(x+2)}{(x+3)^2}\right] \rightarrow \boxed{\log x + \log(x+2) - 2\log(x+3)}$

53) $\ln \left[\frac{x^2-x-2}{(x+2)^3}\right]^{\frac{1}{3}} \rightarrow \boxed{\frac{1}{3}\left[\ln(x-2) + \ln(x+1) - 2\ln(x+2)\right]}$

55) $\ln \frac{5x\sqrt{1+3x}}{(x-4)^3} \rightarrow \boxed{\ln 5 + \ln x + \frac{1}{2}\ln(1+3x) - 3\ln(x-4)}$

61) $\log_4 (x^2-1) - 5\log_4 (x+1) \rightarrow \log_4 \frac{x^2-1}{(x+1)^5} \rightarrow \log_4 \frac{(x-1)(x+1)}{(x+1)^5} \rightarrow \boxed{\log_4 \frac{x-1}{(x+1)^4}}$

63) $\ln \left(\frac{x}{x-1}\right) + \ln \left(\frac{x+1}{x}\right) - \ln (x^2-1) \rightarrow \ln \frac{\left(\frac{x}{x-1}\right)\left(\frac{x+1}{x}\right)}{x^2-1} \rightarrow \ln \frac{\frac{x+1}{x-1}}{(x-1)(x+1)} \rightarrow \boxed{\ln \frac{1}{(x-1)^2}}$

65) $8\log_2 \sqrt{3x-2} - \log_2 \left(\frac{4}{x}\right) + \log_2 4 \rightarrow \log_2 \frac{(3x-2)^{\frac{1}{2}\cdot 8} \cdot 4}{\frac{4}{x}} \rightarrow \boxed{\log_2 \frac{4(3x-2)^4}{x}}$

67) $2\log_a (5x^3) - \frac{1}{2}\log_a (2x+3) \rightarrow \log_a \frac{(5x^3)^2}{\sqrt{2x+3}} \rightarrow \boxed{\log_a \frac{25x^6}{\sqrt{2x+3}}}$

1. Without using a calculator, find the **exact** value of $\log_4[\log_3(\log_2 8)]$

$\log_2 8 = x$
$2^x = 8$
$x = 3$

$\log_3 3 = x$
$3^x = 3$
$x = 1$

$\log_4 [\log_3 (3)] \rightarrow \log_4 [1] = x$
$4^x = 1$
$\boxed{x = 0}$