3.6 #15-39odd	Solving polynomial inequalities
#47, 53-61odd	Solving rational inequalities
3.7: #23-37 odd	Variation
4.1 #17-23 odd	prove f is one-to-one; prove g is not one-to-one
#59-63 odd	determine if f is on-to-one and if so, determine its inverse
#77-81 odd	sketch the inverse function by reflecting over y=x
#83-87 odd	use composition to show that the functions are inverses
4.2 #5-10all	match an exponential function to its graph
#11-41odd	sketch graphs of exponential functions using transformations
#43a,b,c,45,47	compound interest word problems
4.3 #1-8all	sketch graphs of logarithmic functions
#9-33odd	evaluate log expressions without a calculator
#35-53 odd	convert between logarithmic and exponential expressions
#69-77 odd	apply change of base formula & calculator to approximate log expressions
#83-90 all	graph logarithmic functions using transformations

4.4 # 31,33, 49-55 odd; 65-75 odd; 107 applying log rules

4.5 # 1-25 odd; solving exponential equations; #27-47 odd solving logarithmic equations

4.6 #5,7,9,15,17 application problems

$$\frac{2}{3}\left[\ln(x^2-9)-\ln(x+3)\right]+\ln(x+y)=$$

$$=\frac{2}{3}\ln\frac{x^2-9}{x+3}+\ln(x+y)=$$

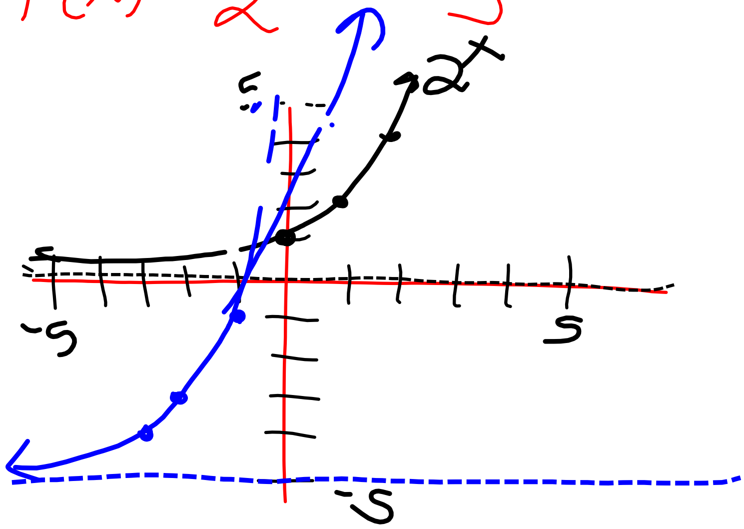
$$=\frac{2}{3}\ln\frac{\cancel{(x+3)}(x-3)}{\cancel{x+3}}+\ln(x+y)=$$

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

$$=\ln(x-3)^{2/3}+\ln(x+y)=$$

$$=\ln\left[(x-3)^{2/3}(x+y)\right]$$

$f(x)=2^{x+3}-5$



$5^{\log_5(4x-3)}$

$= 4x-3$

$a^{(\log_a x)} = x$

$\log_a(a^x) = x$

$\log_2 \frac{1}{4} = \log_2 1 - \log_2 4$

$= 0 - 2 = -2$

$2^{-2} = \frac{1}{2^2} = \frac{1}{4}$

$\ln \frac{1}{e^5} = \log_e e^{-5} = -5$

$f(x) = a^x$; $g(x) = \log_a x$

If f & g are inverses,

$f(g(x)) = x$ & $g(f(x)) = x$

$a^{\log_a x} = x$ $\log_a(a^x) = x$

$$\log_b \sqrt{b^3} = \log_b b^{3/2} = 3/2$$

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

$$\ln x - 3\ln(x^2-25)$$

$$\ln x - \ln(x^2-25)^3 = \ln \frac{x}{(x^2-25)^3}$$

$$\ln x - 3\ln(x-5) - 3\ln(x+5)$$

$$\ln x - \ln(x-5)^3 - \ln(x+5)^3$$

$$= \ln \frac{x}{(x-5)^3(x+5)^3}$$

$$[(x-5)(x+5)]^3$$

$$\log_c \sqrt[3]{\frac{y^3z^2}{x^4}} = \log_c \left(\frac{y^3z^2}{x^4}\right)^{1/3}$$

$$= \log_c \frac{y^1 z^{2/3}}{x^{4/3}} =$$

$$= \log_c y + \log_c z^{2/3} - \log_c x^{4/3}$$

$$= \boxed{\log_c y + \frac{2}{3}\log_c z - \frac{4}{3}\log_c x}$$

Determine whether the statement is true. Assume that a, x, M, and N are positive.

102. $\log_N (MN)^x = x\log_N M + x$

$LHS = x\log_N(MN) =$

$= x[\log_N M + \log_N N] =$

$= x[\log_N M + 1] = x\log_N M + x = RHS$ ✓

Write without using logarithms.

106. $\underbrace{\log_a x + \log_a y} - mz = 0$

$\log_a b = c$

$\Updownarrow$

$a^c = b$

$\log_a(xy) - mz = 0$

$\log_a(xy) = mz$

$a^{mz} = xy$

4.5 Solving Exponential & Logarithmic Equations

$3^{2x} = 3^5$

$\log_3 3^{2x} = \log_3 3^5$

$2x = 5$

$x = 5/2$

$\log_3 2x = \log_3 5$

$3^{\log_3 2x} = 3^{\log_3 5}$

$2x = 5$

$x = 5/2$

For any $a > 0, a \neq 1,$

$\boxed{a^x = a^y \leftrightarrow x = y}$

Similarly, for M,N>0, $a > 0, a \neq 1,$

$\boxed{\log_a M = \log_a N \leftrightarrow M = N}$

$2^x = 7$

$\ln 2^{x} = \ln 7$

$x \ln 2 = \ln 7$

$\boxed{x = \frac{\ln 7}{\ln 2}}$

$e^{50t} = 300$

$\ln e^{50t} = \ln 300$

$50t = \ln 300$

$\boxed{t = \frac{(\ln 300)}{50}}$

$$\log x + \log(x+3) = 1$$

$\log_a b = c \iff a^c = b$

$\log_{10}\left(x(x+3)\right) = 1$

$10^1 = x(x+3)$

$0 = x^2 + 3x - 10$

$0 = (x+5)(x-2) \Rightarrow x = \cancel{-5}, \boxed{2}$

4. $3^{7x} = 27$

$3^{7x} = 3^3$

$7x = 3$

$\boxed{x = 3/7}$

10. $3^{x^2+4x} = \dfrac{1}{27}$

$3^{x^2+4x} = 3^{-3}$

$x^2 + 4x = -3$

$x^2 + 4x + 3 = 0$

$(x+3)(x+1) = 0$

$\boxed{x = -3, -1}$