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

$\log_a(MN) = \log_a M + \log_a N$

$\log_a\left(\frac{M}{N}\right) = \log_a M - \log_a N$

$\log_a(M^p) = p \cdot \log_a M$

$\log_a a = 1$; $\log_a 1 = 0$

$\log_a a^x = x$; $a^{\log_a x} = x$

$\log_a b = \frac{\log_c b}{\log_c a}$

4.5 Solving Exponential & Logarithmic Equations

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

$2x = 5$

$\boxed{x = 5/2}$

$\log_3 2x = \log_3 5$

$2x = 5$

$\boxed{x = 5/2}$

f is one-to-one if $f(a) = f(b) \Rightarrow a = b$
or $a \neq b \Rightarrow f(a) \neq f(b)$

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

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

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

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

$2^x = 7$

$\ln 2^x = \ln 7$

$x \cdot \ln 2 = \ln 7$

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

$e^{50t} = 300$

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

$50t \cdot \ln e = \ln 300$

$50t = \ln 300$

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

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

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

$\log_{10}[x(x+3)] = 1$

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

$10 = x^2 + 3x$

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

$0 = (x+5)(x-2)$

$\cancel{x = -5}$, $\boxed{x = 2}$

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

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

$7x = 3$

$\boxed{x = 3/7}$

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

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

$x^2+4x = -3$

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

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

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

12. $28^x = 10^{-3x}$

$\log 28^x = \log 10^{-3x}$

$x \log 28 = -3x$

$x \log 28 + 3x = 0$

$x(\log 28 + 3) = 0$

$x = \frac{0}{\log 28 + 3}$

$\boxed{x = 0}$

20. $5^{x+2} = 4^{1-x}$

$\ln 5^{x+2} = \ln 4^{1-x}$

$(x+2)\ln 5 = (1-x)\ln 4$

$x\ln 5 + 2\ln 5 = \ln 4 - x\ln 4$

$x\ln 5 + x\ln 4 = \ln 4 - 2\ln 5$

$x(\ln 5 + \ln 4) = \ln 4 - 2\ln 5$

$\boxed{x = \dfrac{\ln 4 - 2\ln 5}{\ln 5 + \ln 4}} = \dfrac{\ln 4 - \ln 5^2}{\ln(5\cdot 4)} = \boxed{\dfrac{\ln\left(\frac{4}{25}\right)}{\ln 20}}$

<u>HW #8</u> (due Fri. 10/3)

<u>4.3</u>	#1-8 all	sketch graphs of logarithmic functions
	#9-33 odd	evaluate log expressions <u>without</u> 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
<u>4.4</u>	# 31,33, 49-55 odd; 65-75 odd; 107	applying log rules
<u>4.5</u>	# 1-25 odd;	solving exponential equations
	#27-47	odd solving logarithmic equations
<u>4.6</u>	#5,7,9,15,17	application problems

Quiz #3 - Monday 9/29
Test #3 - Wed 10/8