EXPONENTIAL EQUATIONS

$\left(\frac{1}{9}\right)^{4x} = 27^{x+2}$

Make common bases!

$\left(\frac{1}{3^2}\right)^{4x} = \left(3^3\right)^{x+2}$

$\left(3^{-2}\right)^{4x} = 3^{3x+6}$

$3^{-8x} = 3^{3x+6}$

$-8x = 3x+6$

$-3x \quad -3x$

$\frac{-11x}{-11} = \frac{6}{-11}$

$x = -6/11$

* Solve exp. equations
* e!
* Intro to logs
* Evaluate logs
* Graph logs??

Solve.

$$\sqrt[3]{4^x} = \left(\frac{1}{8}\right)^{5-x}$$

$$\sqrt[3]{2^{2x}} = \left(\frac{1}{2^3}\right)^{5-x}$$

$$2^{2x/3} = \left(2^{-3}\right)^{5-x}$$

$$2^{\frac{2x}{3}} = 2^{-15+3x}$$

$$\frac{2x}{3} = -15 + 3x$$

$$2x = -45 + 9x$$

$$45 = 7x$$

$$\frac{45}{7} = x$$

Purpose: Logs – to solve for exponents.

$$7^{x+2} = 5^{3x-1}$$

Leonard Euler (Oiler)

"Nature Number"

$$e = \left(1 + \frac{1}{n}\right)^n \approx 2.718$$

$n=1 \quad \left(1+\frac{1}{1}\right)^1 = 2$) 0.25

$n=2 \quad \left(1+\frac{1}{2}\right)^2 = 2.25$) 0.12

$n=3 \quad \left(1+\frac{1}{3}\right)^3 = 2.37$) 0.07

$n=4 \quad \left(1+\frac{1}{4}\right)^4 = 2.44$

$$2e^2 \cdot e^5 = 2e^7$$

$$\frac{4e^7}{28e^{9-7}} = \frac{1}{7e^2}$$

LOGARITHMS - used to solve for exponents!

Exp Func

$y = b^x$

$b > 0, b \neq 1$

$2^3 = 8$

$3 = \log_2 8$

Logarithms - inverse of an exp func

$y = b^x$

$x = b^y$

$y = \log_b x$

$\log_b$ base b, of x

John Napier 1614

Exponential Form

$y = b^x$

Logarithmic Form

$x = \log_b y$

Logarithms represent EXPONENTS!

$5^3 = 125$

$3 = \log_5 125$

$\log_7 49 = 2$

$7^2 = 49$

$8^{\log_8 4} = 4$

Evaluate.

$\log_6 36 = \log_6 6^2 = 2$

$\log_2 16 = \log_2 2^4 = 4$

$\log_3 \sqrt[5]{3^1} = \log_3 3^{1/5} = \frac{1}{5}$

$\log_{12} \frac{1}{144} = \log_{12} \frac{1}{12^2} = \log_{12} 12^{-2} = -2$

$\log_{11} \sqrt[3]{\frac{1}{121}} = \log_{11} \sqrt[3]{\frac{1}{11^2}} = \log_{11} \sqrt[3]{11^{-2}}$

$= \log_{11} 11^{-2/3} = \frac{-2}{3}$

Common Logs	Natural Logs
$\log_{10} x = \log x$	$\log_e x = \ln x$

$\log 1000 = \log_{10} 10^3 = 3$

$\log 0.01 \quad \log_{10} 10^{-2} = -2$

$\ln e^8 = 8$

$\ln e^{2.63} = 2.63$

$e^{\ln 17}$

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