

PROPERTIES OF LOGARITHMS

$$\log_b m + \log_b n = \log_b (m \cdot n)$$

$$\log_b m - \log_b n = \log_b \left(\frac{m}{n}\right)$$

$$\log_b m^p = p \cdot \log_b m$$

Logarithms
represent
exponents!

$$x^3 \cdot x^8 = x^{11}$$

$$\log_7(x+5) + \log_7(x-3) = 2\log_7 3$$

Condense to
one term on
each side of
= sign
using the
properties

$$\log_7(x+5)(x-3) = \log_7 3^2$$

$$\log_7(x^2+2x-15) = \log_7 9$$

$$7^{\log_7(x^2+2x-15)} = 7^{\log_7 9}$$

2) Exponentiate!!

$$x^2+2x-15 = 9$$

$$x^2+2x-24 = 0$$

$$(x+6)(x-4) = 0$$

$$x = -6, 4$$

Check!

$$\ln 4x + \ln 3 - \ln 6 = 3\ln 4$$

$$\ln\left(\frac{4x \cdot 3}{6}\right) = \ln 4^3$$

$$\ln 2x = \ln 64$$

$$e^{\ln 2x} = e^{\ln 64}$$

$$2x = 64$$

$$\boxed{x = 32}$$

$$\log \overset{\downarrow}{x} + \log(x+3) = 1$$

$$\log_{10}(x^2+3x) = 1$$

$$10^{\log_{10}(x^2+3x)} = 10^1$$

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

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

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

Check: $x = -\cancel{5}, 2$

$$\log_7(1-x)$$

$$\begin{array}{c} \uparrow \\ -5 \\ 1 - 5 = -4 \end{array}$$

$$\ln(x+2) - \ln 4 = 3$$

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

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

$$\cancel{4} \cdot \frac{x+2}{\cancel{4}} = e^3 \cdot \cancel{4}$$

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

$$x = 4e^3 - 2$$

$$\approx 78.34$$