EXPONENTIAL & LOGARITHMIC FUNCTIONS

$y = b^x \quad b > 0, \ b \neq 1 \qquad y = \log_b x$

exponent

Domain: $(0, \infty)$

$y = 2^x \quad y = 15^x$
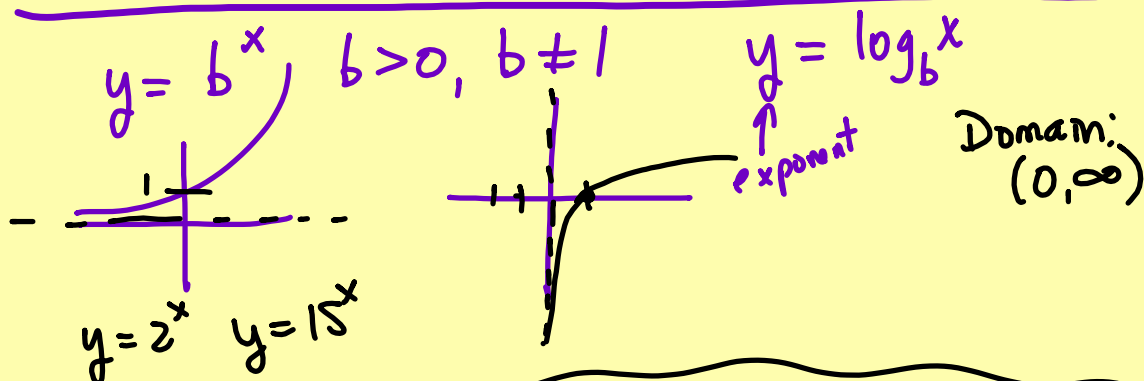
$\log_{10} 1000 = \log_{10} 10^3 = 3$

$\log \frac{1}{100} = \log \frac{1}{10^2} = \log_{10} 10^{-2} = -2$

$\log_e x = \ln x \qquad \ln \sqrt[5]{e^2} = \ln e^{2/5} = \frac{2}{5}$

$\ln_e e^{81} = 81$

$e^{\ln 1/17} = \frac{1}{17}$

Solve.

$$\ln(x+1) + \ln(x-3) = 2\ln x$$

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

$$\cancel{x^2} - 2x - 3 = \cancel{x^2} \\ -x^2$$

$$-2x - 3 = 0$$

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

$$x = \cancel{-\frac{3}{2}}$$

No solution

Properties of Logs

$$\ln a + \ln b = \ln ab$$

$$\ln a - \ln b = \ln\left(\frac{a}{b}\right)$$

$$\ln a^p = p\ln a$$

$$\log_6 x = 7$$

$$6^{\log_6 x} = 6^7$$

$$\ln x - \ln(2x-1) = 8$$

$$e^{\ln\left(\frac{x}{2x-1}\right)} = e^8$$

$$\cancel{(2x-1)}\,\frac{x}{\cancel{2x-1}} = e^8(2x-1)$$

$$x = 2e^8 x - e^8$$

$$e^8 = 2e^8 x - x$$

$$e^8 = x(2e^8 - 1)$$

$$\frac{e^8}{2e^8 - 1} = x$$

$$0.50 \approx x$$

$$42e^{5x-3} + 9 = 282$$

$$\phantom{42e^{5x-3}} - 9 \quad -9$$

$$\frac{\cancel{42}\,e^{5x-3}}{\cancel{42}} = \frac{273}{42}$$

$$\ln\left(e^{5x-3}\right) = \ln(6.5)$$

$$5x - 3 = \ln(6.5)$$

$$\frac{5x}{5} = \frac{\ln(6.5) + 3}{5}$$

$$\approx 0.97$$

PARTIAL FRACTIONS

$$(2x-5)(3x-2) \; \frac{26x-43}{6x^2-19x+10} = \frac{(2x-5)(3x-2)\,A}{2x-5} + \frac{B}{3x-2}$$

$(2x-5)(3x-2)$

1) Multiply by Common Denom. (Orig. denom)

$$26x - 43 = A(3x-2) + B(2x-5)$$

$$26x - 43 = 3Ax - 2A + 2Bx - 5B$$

$$26 = 3A + 2B$$
$$-43 = -2A - 5B$$

$$\begin{bmatrix} 3 & 2 \\ -2 & -5 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 26 \\ -43 \end{bmatrix}$$

$$\boxed{\frac{4}{2x-5} + \frac{7}{3x-2}}$$

$$\frac{}{(3x^2+4)(x-7)} = \frac{Ax^1+B}{3x^2+4} + \frac{Cx^2+Dx+E}{x^3-7}$$

$$\frac{}{x^2(2x+7)} = \frac{A}{x^2} + \frac{B}{x} + \frac{C}{2x+7}$$

$$\frac{(x-0)^2}{(x+4)^2(x-2)} = \frac{A}{(x+4)^2} + \frac{B}{(x+4)^1} + \frac{C}{x-2}$$

<u>Slope-Int</u>

$$y = mx + b$$

<u>Point-Slope</u>

$$y - y_1 = m(x - x_1)$$