EXPONENTIAL + LOGARITHMIC FUNCTIONS

$y = b^x$

$b > 0,\ b \neq 1$

Domain: $(0,1) \cup (1, \infty)$

$x = \log_b y$

$\ln e^{18} = \log_e e^{18} = 18$

$e^{3 \ln 5} = e^{\ln 5^3} = e^{\ln 125} = 125$

$\log_9 \frac{1}{81} = \log_9 \frac{1}{9^2}$

$= \log_9 9^{-2}$

$= -2$

$\log_3 \sqrt[5]{27} = \log_3 \sqrt[5]{3^3}$

$= \log_3 3^{3/5}$

$= 3/5$

Properties

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

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

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

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

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

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

$-3 = 2x$

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

No solution

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

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

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

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

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

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

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

$$0.50 \approx x$$

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

$$\quad -9 \quad -9$$

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

$$\ln e^{5x-3} = \ln\frac{13}{2}$$

$$5x-3 = \ln\left(\tfrac{13}{2}\right)$$

$$\frac{\cancel{5}x}{\cancel{5}} = \frac{\ln\left(\frac{13}{2}\right)+3}{5}$$

$$\approx 0.97$$

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

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

$$(2x-5)(3x-2)\left[\frac{26x-43}{(2x-5)(3x-2)} = \frac{A}{\cancel{2x-5}} + \frac{B}{3x-2}\right]$$

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

$$26x-43 = \underline{3A}\,x - 2A + \underline{2B}\,x - 5B$$

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

$$\begin{bmatrix} 3 & 2 \\ -2 & -5 \end{bmatrix}^{-1} \cdot \begin{bmatrix} 26 \\ -43 \end{bmatrix} = \begin{bmatrix} 4 \\ 7 \end{bmatrix}$$

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

$$2\ln|2x-5| + \frac{7}{3}\ln|3x-2|$$

$$\frac{\quad}{(3x^2+7)(2x-5)} = \frac{Ax+B}{3x^2+7} + \frac{C}{2x-5}$$

$$(\quad)^2$$

$$\frac{\quad}{x^3(x-4)^2} = \frac{A}{(x^1-4)^2} + \frac{B}{(x^1-4)^1} + \frac{C}{x^3} + \frac{D}{x^2} + \frac{E}{x}$$

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

Find the eq. of the line perpendicular to

$\perp$ to $5x + 4y = 12$ + passes through $(-7, 5)$.

$m = -\frac{A}{B} = -\frac{5}{4}$ $\quad \perp m = \frac{4}{5}$

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

$y - 5 = \frac{4}{5}(x + 7)$

$y - 5 = \frac{4}{5}x + \frac{28}{5}$

$\quad +5 \qquad\qquad\qquad +5$

$y = \frac{4}{5}x + \frac{53}{5}$