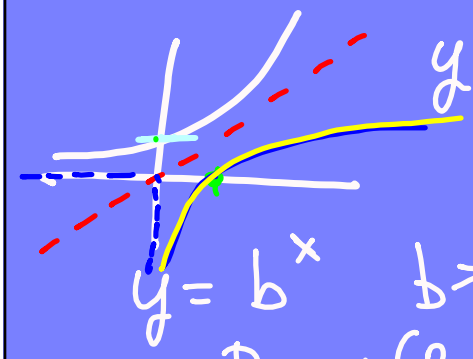
August 23, 2022

Exponential Functions



$y = 2^x$

x	$y = 2^x$
0	$2^0 = 1$
1	$2^1 = 2$
2	$2^2 = 4$
3	$2^3 = 8$

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

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

$y = \log_b x$

$\ln e^8 = 8$

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

Properties of Logs

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

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

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

$27^{2/3} = \sqrt[3]{27^2}$

$= 3^2$

$= 9$

Solve for x.

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

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

$$x^2 - 2x - 3 = x^2$$

$$-3 = 2x$$

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

No Solution

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

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

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

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

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

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

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

$$\approx 0.50 = x$$

PARTIAL FRACTIONS

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

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

$$\frac{26x-43}{(2x-5)(3x-2)} = \frac{A(3x-2)}{(2x-5)(3x-2)} + \frac{B(2x-5)}{(3x-2)(2x-5)}$$

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

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

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

$$26 = 3A + 2B$$

$$-43 = -2A - 5B$$

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

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

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

$$(x-0)^3$$

Lines

Find the eq of line between $(2,-3)$ & $(4,7)$

$$m = \frac{7-(-3)}{4-2} = \frac{10}{2} = 5$$

$y = mx + b$

Point-Slope

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

$y - 7 = 5(x - 4)$