

3.4 Properties of Logarithmic Fncs.

- Obj: 1. Apply properties of logs to evaluate expressions & graph.
2. Use change of Base formula

Properties

Product Rule: $\log_b(R \cdot S) = \log_b R + \log_b S$

$$\log_b(3x) = \log_b 3 + \log_b x$$

Quotient Rule: $\log_b\left(\frac{R}{S}\right) = \log_b R - \log_b S$

$$\log_2\left(\frac{x}{2}\right) = \log_2 x - \log_2 2$$

$$= \log_2 x - 1$$

Power Rule: $\log_b R^c = c \log_b R$

Nov 16-9:35 AM

Write $\log_{10}(8 \cdot x \cdot y^4)$ as a sum of logs.

$$\log_{10} 8^3 + \log_{10} x + \log_{10} y^4$$

$$3 \log_{10} 2 + \log_{10} x + 4 \log_{10} y$$

$$\log_{10} x^3 \cdot y^2$$

$$\log_{10} x^3 + \log_{10} y^2$$

$$3 \log_{10} x + 2 \log_{10} y$$

Nov 16-9:41 AM

$$\ln\left(\frac{\sqrt{x^2+5}}{x}\right)$$

$$\ln(\sqrt{x^2+5}) - \ln x$$

$$\ln(x^2+5)^{\frac{1}{2}} - \ln x$$

$$\frac{1}{2} \ln(x^2+5) - \ln x$$

$$\ln\left(\frac{2x^2}{y^3}\right)$$

$$\ln 2x^2 - \ln y^3$$

$$\ln 2 + \ln x^2 - \ln y^3$$

$$\ln 2 + 2\ln x - 3\ln y$$

Nov 16-9:45 AM

Condensing

write $\ln x^5 - 2\ln(xy)$ as one logarithm.

$$\ln(x^5) - \ln(xy)^2$$

$$\ln\left(\frac{x^5}{(xy)^2}\right) = \ln \frac{x^{\cancel{5}}}{x^{\cancel{2}}y^2} = \ln \frac{x^3}{y^2}$$

Nov 16-9:50 AM

$$\log x + \log y - \log z$$

$$\log(xy) - \log z$$

$$\log \frac{xy}{z}$$

$$2 \ln x + 3 \ln y$$

$$\ln x^2 + \ln y^3$$

$$\ln(x^2 \cdot y^3)$$

Nov 16-9:52 AM

$$\log_3 16 = \frac{\log_5 16}{\log_5 3}$$

Change of Base Formula:

$$\log_b a = \frac{\log_c a}{\log_c b} = \frac{\ln a}{\ln b} = \frac{\log a}{\log b}$$

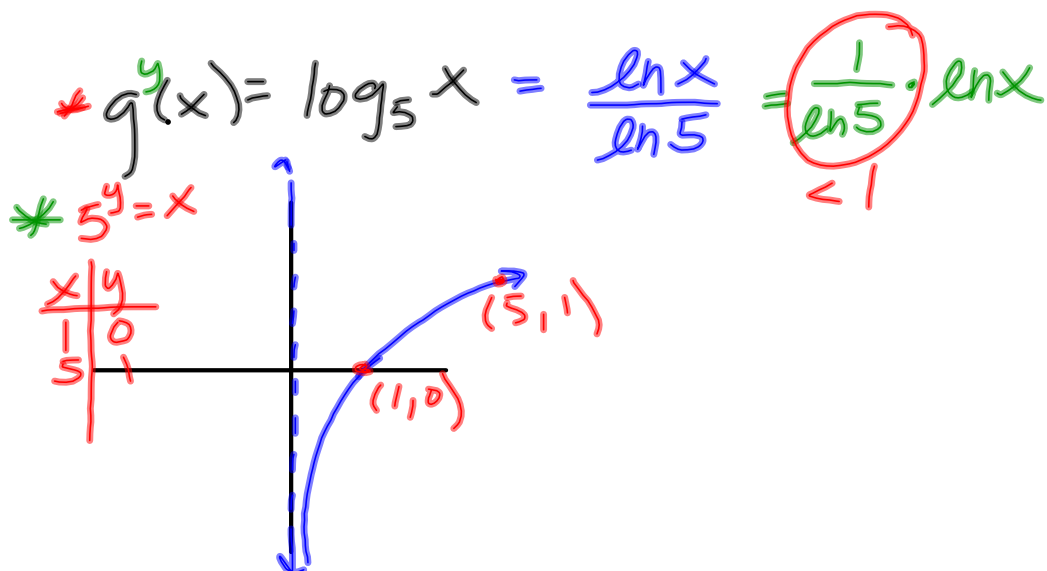
Nov 16-9:56 AM

$$\log_6 10 = \frac{\log_e 10}{\log_e 6} = \frac{1}{\log_e 6} \approx 1.285$$

$$\log_{\frac{1}{2}} 2 = \frac{\ln 2}{\ln \frac{1}{2}} = \frac{\ln 2}{\ln 1 - \ln 2} = \frac{\ln 2}{-\ln 2} = -1$$

$e^0 = 1$

Nov 16-9:59 AM



Nov 16-10:05 AM