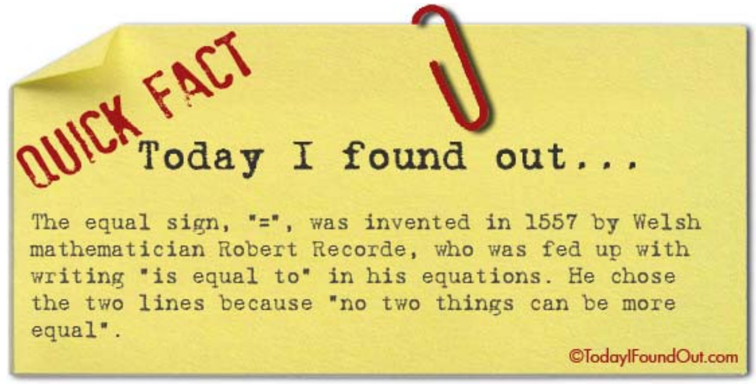
Wednesday, November 9, 2016

3.4 - Properties of Logs

Answer the problems below in your notebook:



① $x^5 \cdot x^3 = x^8$

② $\dfrac{x^6}{x^2} = x^4$

③ $(a^3 b)^2 = a^6 b^2$

④ $(2x^2 y^5)^3 = 8x^6 y^{15}$

⑤ $a^{-3} = \dfrac{1}{a^3}$

⑥ $4x^{-2} = \dfrac{4}{x^2}$

⑦ power / root: $2^{\frac{3}{2}} = \sqrt{8} = \sqrt[2]{2^3}$

* Remember, Logs are Exponents!

$y = b^x \iff \log_b y = x$ ← exponent

3.4 Properties of Logs

Product Rule

$$\log_b(x \cdot y) = \log_b x + \log_b y$$

① $\log 9y$

$= \log 9 + \log y$

② $\log_2 4x$

$= \log_2 4 + \log_2 x$

$= 2 + \log_2 x$

③ Write as a single log:

$\log_3 2 + \log_3 5$

$= \log_3 10$

Quotient Rule

$$\log_b\left(\frac{x}{y}\right) = \log_b x - \log_b y$$

① $\log 700 - \log 7$

$= \log 100$

$= 2$

② $\log \frac{x}{2}$

$= \log x - \log 2$

$$\boxed{\begin{array}{l}\text{Power Rule}\\ \log_b x^m = m \log_b x\end{array}}$$

① $\log 5^3 = 3\log 5$ (also $\log 125$)

② $\ln x^2 = 2\ln x$

③ $\log \sqrt[3]{z} = \frac{1}{3}\log z$

④ $\log 2x^5 = \log 2 + \log x^5$

$= \log 2 + 5\log x$

Change of Base helps to log/ln in calculator

$$\log_b x = \frac{\log x}{\log b} \qquad \log_b x = \frac{\ln x}{\ln b}$$

① $\log_2 5 = \frac{\log 5}{\log 2} \approx 2.322$

$= \frac{\ln 5}{\ln 2} \approx 2.322$