Class Discussion

Unit 3 Topic 3 Logarithmic properties

Objective: Understand and Apply the change of base formula and apply fluently the power/product/quotient formulas to condense and expand a logarithmic expression

What is the change of base formula?

Change of base formula: $\log_c b = \dfrac{\log_a b}{\log_a c}$ if $a, b, c > 0$ and $a \neq 1, c \neq 1$

Product property

$$\log_a xy = \log_a x + \log_a y$$

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

$$\log_a \left(x^b \right) = b \log_a x$$

Example 1:

(a) Expand $\log_2 \left(\dfrac{x^2 - 5x + 6}{\sqrt{x+3}} \right)$ (b) Condense to base 2 for $\log_4 (x+2) - \log_2 (x^2 - 4)$

(c) Condense to base 3 for $\log_3 (x+2) - \log_9 (x+4)$

Example 2:

Use $\log 2 = \dfrac{3}{10}$, $\log 3 = \dfrac{12}{25}$, $\log 7 = \dfrac{21}{25}$, and $\ln 10 = \dfrac{23}{10}$ to evaluate

(a) $\ln 7$ (b) $\log_{15} 16$