

Questions from Homework

Ex 4.2

a) Find the value of $\log_2 64$

$$\text{Let } x = \log_2 64 \rightarrow \log_2 64 = 6$$

$$2^x = 64$$

$$2^x = 2^6$$

$$x = 6$$

b) Find the value of $\log_2 128$

$$\text{Let } x = \log_2 128 \rightarrow \log_2 128 = 7$$

$$2^x = 128$$

$$2^x = 2^7$$

$$x = 7$$

c) What is the value of $\log_2 64 + \log_2 128$

$$= 6 + 7$$

$$= 13$$

d) $\log_2 (64 \times 128)$

$$\log_2 8192$$

$$\text{Let } x = \log_2 8192 \rightarrow \log_2 8192 = 13$$

$$2^x = 8192$$

$$2^x = 2^{13}$$

$$x = 13$$

Ex 4.3

④ i) $x = \log_2 8\sqrt{2}$

$$2^x = 8\sqrt{2}$$

$$2^x = (2^3)(2^{1/2})$$

$$2^x = 2^{3+1/2}$$

$$2^x = 2^{7/2}$$

$$x = \frac{7}{2}$$

⑥ f) $5^{(\log_5 8 - \log_5 2)}$

$$5^{(\log_5 4)}$$

$$5^{\log_5 4}$$

$$4$$

When solving some logarithmic equations, or simplifying logarithmic expressions, you will use the following property.

$$b^{\log_b m} = m$$

Example 4

$$\text{a) } 2^{\log_2 4} = 4$$

$$\text{b) } 7^{\log_7 2401} = 2401$$

Logarithms

exponential form

$$x = b^y$$

Say "the base ***b*** to the exponent ***y*** is ***x***."

logarithmic form

$$y = \log_b x$$

Say "***y*** is the exponent to which you raise base ***b*** to get the answer ***x***."

$$x = b^y \longleftrightarrow y = \log_b x$$

Product Law for Logarithms

$$\log_b M + \log_b N = \log_b (MN)$$

Example 1

$$\log_3 54 + \log_3 \left(\frac{3}{2} \right)$$

$$\log_3 \left(54 \cdot \frac{3}{2} \right)$$

$$\log_3 81$$

$$4$$

$$\log_3 54 + \log_3 \left(\frac{3}{2} \right)$$

$$3.63 + 0.37$$

Quotient Law for Logarithms

$$\log_b M - \log_b N = \log_b \left(\frac{M}{N} \right)$$

Example 2

$$\begin{array}{l|l} \log_2 24 - \log_2 6 & \log_2 24 - \log_2 6 \\ \log_2 \left(\frac{24}{6} \right) & 4.585 - 2.585 \\ \log_2 4 & 2 \\ 2 & \end{array}$$

Homework

Omit #7 of Exercise 4.6

⑧ Express as a single logarithm

$$a) \log_2 x + \log_2 y + \log_2 z - \log_2 a$$

$$\log_2 xyz - \log_2 a$$

$$\log_2 \left(\frac{xyz}{a} \right)$$

