

## Chapter 4

### Playing with Logarithms

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**Definition:**

$$\log_a(x) = y \quad \text{if and only if} \quad \underline{\hspace{2cm}}.$$

**2.** Evaluate the following logarithms without using a calculator.

- $\log(1,000,000)$
- $\log_5\left(\frac{1}{25}\right)$
- $\log_6(18) + \log_6(2)$
- $\log_2(200) - \log_2(25)$ .

**3.** What is the domain and range of  $\ln(x)$ ?

4. Expand each of the following logarithms as far as possible.

- $\log_5(x^3y^6)$
- $\ln\left(\frac{ab}{\sqrt{c}}\right)$
- $\log\left(\sqrt[3]{x^2 \cdot \frac{z^6}{\sqrt{w}}}\right)$

5. Rewrite each expression as a single logarithm.

- $\log(a + b) + \log(a - b) - 2\log(c)$
- $4\log_6(y) - \frac{1}{4}\log_6(z)$
- $\log(5) + 2\log(x) + 3\log(x^2 + 5)$

## Analyzing Tables

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Determine if each of the following tables can be modeled by linear function, an exponential function or neither. If the table is linear or exponential, give the function which models the data.

$x$	$y$
0	800
1	1200
2	1680
3	2184
4	2839

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$x$	$y$
0	12,000
3	10,500
6	9,000
9	7,500
12	6,000

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$x$	$y$
4	1400
5	2240
6	3584
7	5734.4
8	9175.04