

2 Exponents

2.1 Tues., Mar. 5: Expansion of b^x

We often want to consider powers of a number where:

$$b^x = \underbrace{b \cdot b \cdot b}_{x \text{ times}} = y$$

From this idea we can derive “rules” for exponents.

$$x^0 = 1 \tag{3}$$

$$x^a \cdot x^b = x^{a+b} \tag{4}$$

$$(x^a)x^b = x^{a \cdot b} \tag{5}$$

$$\frac{x^a}{x^b} = x^{a-b} \tag{6}$$

$$\frac{x^a}{x^a} = \left(\frac{x}{x}\right)^a \tag{7}$$

$$x^{a/b} = \sqrt[b]{x^a} \tag{8}$$

The logarithm language rewrites this in the format:

$$\log_b y = x \tag{9}$$

Where:

$$b^x = y \tag{10}$$

I’ve used the variables x and y in a consistent manner here, so you can copy between the formulas. But usually logs will be written such that the dependent variable, y , is the exponent... making them the inverse of b^x . The change of base format is very useful and helpful to consider as we understand logs:

$$\log_a x = \frac{\log_b x}{\log_b a} \tag{11}$$