Exponentials and Logarithms

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Consider than $100 = 10^2$. In logarithmic form, we say $\log_{10} 100 = 2$.

The laws of logarithms

$$\log_n x + \log_n y = \log_n xy \tag{1}$$

$$\log_n x - \log_n y = \log_n \frac{x}{y} \tag{2}$$

$$\log_n x^k = k log_n x \tag{3}$$

$$\frac{\log_a x}{\log_a b} = \log_b x \tag{4}$$

Rules 1, 2 and 3 must be learn for A-Level.

Natural Logarithms

$e \simeq 2.718\ldots$ e is irrational and transcendental. The exponential function is defined as $y = e^x$. It is special as its derivative is itself. The natural logarithm function is defined as $y = \log_e x = \ln x$. The derivative of $\ln x$ is $\frac{d}{dx} \ln x = \frac{1}{x}$.

Modelling curves with Logarithms

The relationship between x and y