Logarithms

The definition of a log:

$p^q = r \leftrightarrow \log_p r = q$

some basic examples:
$\log_3 9 = 2$
$\log_5 1/5 = -1$
$\log_x (\sqrt[3]{x}) = 1/3$
$log_4(1/8) = -3/2$

Natural Logarithms

- Generally, if the logarithm is base e, it is called the natural log ($\ln$)

Older Notation

In some older questions, the $\log_{10}(x)$ may be expressed as lug(x)

The Log Laws

- $\log_p(xy) = \log_p(x) + \log_p(y)$
- $\log_p(\frac{x}{y}) = \log_p(x) - \log_p(y)$
- $\log_p(x^y) = y\log_p(x)$
- $\log_p(x) = \frac{\log_q(x)}{\log_q(p)}$
  (This one is knonw as the base change rule. It rarely comes up in A-level)
- $\log_p(p) = 1$
- $\log_p(1) = 0$