Multiplicative Inverse

In mathematics, the *multiplicative inverse* or *reciprocal* for a number x, denoted by $\frac{1}{x}$ or x^{-1}, is a number which when multiplied by x yields the multiplicative identity, 1.

> $5^{-1} = 0.20000 \therefore 5 \cdot 0.20000 = 1$

Logarithms

A logarithm is the inverse of taking an exponent and lets you undo exponential effects. For example:

> $2^3 = 8 \therefore log_2 8 = 3$

For this example, it 2 to what power is 8? In this case, 3.

Natural Logarithms use the natural log e which is a constant value of $2.718, 281, 828$.

> $log_e e = 1$

A real-world use of the log function is to make small numbers larger and large number smaller. In machine learning, it can be useful to apply large penalties to low probabilities (ex. Cross-Entropy / Log Loss).