Power mean

A *power mean* is a type of mean.

Given positive real numbers a_1, a_2, ..., a_n, the pth power mean is obtained by taking the arithmetic mean of the pth powers of a_1, ..., a_n, and then taking the pth root of this:

$$\left(\frac{a_1^p + a_2^p + \cdots + a_n^p}{n}\right)^{\frac{1}{p}}$$

There are some familiar special cases:

- $p = 1$ is the arithmetic mean
- $p = -1$ is the harmonic mean
- $p = 2$ is the root mean square

(The arithmetic mean and root mean square also work even if some of the numbers are zero or negative.)

Different power means for the same a_1, ..., a_n satisfy the inequality:

$$\text{if } p > q, \text{ then the } p\text{th power mean} \geq \text{the } q\text{th power mean}$$

with equality if and only if all of the a_i are equal to each other.