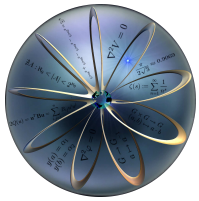

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arithmetic mean

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Entry type	Definition
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Synonym	average
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Related topic	GeometricMean
Related topic	HarmonicMean
Related topic	ArithmeticGeometricMeansInequality
Related topic	GeneralMeansInequality
Related topic	WeightedPowerMean
Related topic	PowerMean
Related topic	GeometricDistribution2
Related topic	RootMeanSquare3
Related topic	ProofOfGeneralMeansInequality
Related topic	ProofOfArithmeticGeometricHarmonicMeansInequality
Related topic	DerivationOfHarm
Defines	weighted mean
Defines	weighted average

If a_1, a_2, ..., a_n are real numbers, their *arithmetic mean* is defined as

$$A.M. = \frac{a_1 + a_2 + \ldots + a_n}{n}.$$

The arithmetic mean is what is commonly called the *average* of the numbers. The value of $A.M.$ is always between the `http://planetmath.org/MinimalAndMaximalNumbe` and the greatest of the numbers a_j. If the numbers a_j are all positive, then $A.M. > \frac{a_j}{n}$ for all j.

A generalization of this concept is that of *weighted mean*, also known as *weighted average*. Let $w_1, \ldots, w_n$ be numbers whose sum is not zero, which will be known as *weights*. (Typically, these will be strictly positive numbers, so their sum will automatically differ from zero.) Then the weighted mean of $a_1, a_2, \ldots, a_n$ is defined to be

$$W.M. = \frac{w_1 a_1 + w_2 a_2 + \ldots + w_n a_n}{w_1 + w_2 + \ldots + w_n}.$$

In the special case where all the weights are equal to each other, the weighted mean equals the arithmetic mean.