W Mean

Mean

Arithmetic-geometric mean Arithmetic-harmonic mean Cesàro mean Chisini mean Contraharmonic mean Elementary symmetric mean Geometric-harmonic mean Grand mean Heinz mean Heronian - A mean is a quantity representing the "center" of a collection of numbers and is intermediate to the extreme values of the set of numbers. There are several kinds of means (or "measures of central tendency") in mathematics, especially in statistics. Each attempts to summarize or typify a given group of data, illustrating the magnitude and sign of the data set. Which of these measures is most illuminating depends on what is being measured, and on context and purpose.

The arithmetic mean, also known as "arithmetic average", is the sum of the values divided by the number of values. The arithmetic mean of a set of numbers x1, x2, ..., xn is typically denoted using an overhead bar,

x

_

{\displaystyle {\bar {x}}}

. If the numbers are from observing a sample of a larger group, the arithmetic mean is termed the sample mean (

x

_

{\displaystyle {\bar {x}}}

) to distinguish it from the group mean (or expected value) of the underlying distribution, denoted

?

{\displaystyle \mu }

or

?

x

{\displaystyle \mu _{x}}

.

Outside probability and statistics, a wide range of other notions of mean are often used in geometry and mathematical analysis; examples are given below.

Mean value theorem

In mathematics, the mean value theorem (or Lagrange's mean value theorem) states, roughly, that for a given planar arc between two endpoints, there is - In mathematics, the mean value theorem (or Lagrange's mean value theorem) states, roughly, that for a given planar arc between two endpoints, there is at least one point at which the tangent to the arc is parallel to the secant through its endpoints. It is one of the most important results in real analysis. This theorem is used to prove statements about a function on an interval starting from local hypotheses about derivatives at points of the interval.

Mean Mary

Retrieved 2018-01-29. "Tickets | Jane Siberry w/ Mean Mary". The Triple Door. Retrieved 2018-01-29. "vindy.com | Mean Mary grows a following with Trumbull tractor - Mary James (born March 22, 1980), known by the stage name Mean Mary, is an American singer-songwriter, multi-instrumentalist, novelist, producer and YouTube personality. She has been described as having “the unique ability to mix together a variety of musical styles, which can appeal to a wide audience” and her childhood has been described as “a nomadic life that could have been plucked from an adventure novel.”

Weighted geometric mean

_{i=1}^{n}w_{i}\ln x_{i}}{\sum _{i=1}^{n}w_{i}\quad }}\right)} The second form above illustrates that the logarithm of the geometric mean is the weighted - In statistics, the weighted geometric mean is a generalization of the geometric mean using the weighted arithmetic mean.

Given a sample

x

=

(

x

1

,

x

2

…

,

x

n

)

{\displaystyle x=(x_{1},x_{2}\dots ,x_{n})}

and weights

w

=

(

w

1

,

w

2

,

…

,

w

n

)

{\displaystyle w=(w_{1},w_{2},\dots ,w_{n})}

, it is calculated as:

x

¯

=

(

?

i

=

1

n

x

i

w

i

)

1

/

?

i

=

1

n

w

i

=

exp

?

(

?

i

=

1

n

w

i

ln

?

x

i

?

i

=

1

n

w

i

)

$$ {\displaystyle {\bar {x}}=\left(\prod _{i=1}^{n}x_{i}^{w_{i}}\right)^{1/\sum _{i=1}^{n}w_{i}}=\quad \exp \left({\frac {\sum _{i=1}^{n}w_{i}\ln x_{i}}{\sum _{i=1}^{n}w_{i}\quad }}\right)} $$

The second form above illustrates that the logarithm of the geometric mean is the weighted arithmetic mean of the logarithms of the individual values.

If all the weights are equal, the weighted geometric mean simplifies to the ordinary unweighted geometric mean.

A-side and B-side

October 2013. "The Straight Dope: In the record business, what do "b/w" and "c/w" mean?". 15 October 1999. Archived from the original on 4 October 2008. - The A-side and B-side are the two sides of vinyl records and cassettes, and the terms have often been printed on the labels of two-sided music recordings. The A-side of a single usually features a recording that its artist, producer, or record company intends to be the initial focus of promotional efforts and radio airplay, with the aim of it becoming a hit record. The B-side (or "flip-side") is a secondary recording that typically receives less attention, although some B-sides have been as successful as, or more so than, their A-sides.

Use of this language has largely declined in the 21st century as the music industry has transitioned away from analog recordings towards digital formats without physical sides, such as downloads and streaming. Nevertheless, some artists and labels continue to employ the terms A-side and B-side metaphorically to describe the type of content a particular release features, with B-side sometimes representing a "bonus" track or other material.

Generalized mean

mean as M p (x 1 , … , x n) = (? i = 1 n w i x i p ? i = 1 n w i) 1 / p {\displaystyle M_{p}(x_{1},\dots ,x_{n})=\left({\frac {\sum _{i=1}^{n}w_{i}x_{i}^{p}}{\sum - In mathematics, generalized means (or power mean or Hölder mean from Otto Hölder) are a family of functions for aggregating sets of numbers. These include as special cases the Pythagorean means (arithmetic, geometric, and harmonic means).

Lehmer mean

Lehmer mean with respect to a tuple w {\displaystyle w} of positive weights is defined as: L p , w (x) = ? k = 1 n w k ? x k p ? k = 1 n w k ? x k - In mathematics, the Lehmer mean of a tuple

x

{\displaystyle x}

of positive real numbers, named after Derrick Henry Lehmer, is defined as:

L

p

(

x

)

=

?

k

=

1

n

x

k

p

?

k

=

1

n

x

k

p

?

1

.

{\displaystyle L_{p}(\mathbf {x})={\frac {\sum _{k=1}^{n}x_{k}^{p}}{\sum _{k=1}^{n}x_{k}^{p-1}}}.}

The weighted Lehmer mean with respect to a tuple

w

{\displaystyle w}

of positive weights is defined as:

L

p

,

w

(

x

)

=

?

k

=

1

n

w

k

?

x

k

p

?

k

=

1

n

w

k

?

x

k

p

?

1

.

{\displaystyle L_{p,w}(\mathbf {x})={\frac {\sum _{k=1}^{n}w_{k}\cdot x_{k}^{p}}{\sum _{k=1}^{n}w_{k}\cdot x_{k}^{p-1}}}.}

The Lehmer mean is an alternative to power means

for interpolating between minimum and maximum via arithmetic mean and harmonic mean.

Weighted arithmetic mean

The weighted arithmetic mean is similar to an ordinary arithmetic mean (the most common type of average), except that instead of each of the data points - The weighted arithmetic mean is similar to an ordinary arithmetic mean (the most common type of average), except that instead of each of the data points contributing equally to the final average, some data points contribute more than others. The notion of weighted mean plays a role in descriptive statistics and also occurs in a more general form in several other areas of mathematics.

If all the weights are equal, then the weighted mean is the same as the arithmetic mean. While weighted means generally behave in a similar fashion to arithmetic means, they do have a few counterintuitive properties, as captured for instance in Simpson's paradox.

Harmonic mean

arguments. The harmonic mean is the reciprocal of the arithmetic mean of the reciprocals of the numbers, that is, the generalized f-mean with f (x) = 1 x - In mathematics, the harmonic mean is a kind of average, one of the Pythagorean means.

It is the most appropriate average for ratios and rates such as speeds, and is normally only used for positive arguments.

The harmonic mean is the reciprocal of the arithmetic mean of the reciprocals of the numbers, that is, the generalized f-mean with

f

(

x

)

=

1

x

{\displaystyle f(x)={\frac {1}{x}}}

. For example, the harmonic mean of 1, 4, and 4 is

(

1

?

1

+

4

?

1

+

4

?

1

3

)

?

1

=

3

1

1

+

1

4

+

1

4

=

3

1.5

=

2

.

{\displaystyle \left({\frac {1^{-1}+4^{-1}+4^{-1}}{3}}\right)^{-1}={\frac {3}{{\frac {1}{1}}+{\frac {1}{4}}+{\frac {1}{4}}}}={\frac {3}{1.5}}=2\,.}

Mean width

corresponding set is a convex set). The mean width of a line segment L is the length (1-volume) of L. The mean width w of any compact shape S in two dimensions - In geometry, the mean width is a measure of the "size" of a body; see Hadwiger's theorem for more about the available measures of bodies. In

n

{\displaystyle n}

dimensions, one has to consider

(

n

?

1

)

{\displaystyle (n-1)}

-dimensional hyperplanes perpendicular to a given direction

n

^

{\displaystyle {\hat {n}}}

in

S

n

?

1

{\displaystyle S^{n-1}}

, where

S

n

{\displaystyle S^{n}}

is the n-sphere (the surface of a

(

n

+

1

)

{\displaystyle (n+1)}

-dimensional sphere).

The "width" of a body in a given direction

n

^

{\displaystyle {\hat {n}}}

is the distance between the closest pair of such planes, such that the body is entirely in between the two hyper planes (the planes only intersect

with the boundary of the body). The mean width is the average of this "width" over all

n

^

{\displaystyle {\hat {n}}}

in

S

n

?

1

{\displaystyle S^{n-1}}

.

More formally, define a compact body B as being equivalent to set of points in its interior plus the points on the boundary (here, points denote elements of

R

n

{\displaystyle \mathbb {R} ^{n}}

). The support function of body B is defined as

h

B

(

n

)

=

max

{

?

n

,

x

?

|

x

?

B

}

{\displaystyle h_{B}(n)=\max\{\langle n,x\rangle |x\in B\}}

where

n

{\displaystyle n}

is a direction and

?

,

?

{\displaystyle \langle ,\rangle }

denotes the usual inner product on

R

n

{\displaystyle \mathbb {R} ^{n}}

. The mean width is then

b

(

B

)

=

1

S

n

?

1

?

S

n

?

1

h

B

(

n

^

)

+

h

B

(

?

n

^

)

,

{\displaystyle b(B)={\frac {1}{S_{n-1}}}\int _{S^{n-1}}h_{B}({\hat {n}})+h_{B}(-{\hat {n}}),}

where

S

n

?

1

{\displaystyle S_{n-1}}

is the

(

n

?

1

)

{\displaystyle (n-1)}

-dimensional volume of

S

n

?

1

{\displaystyle S^{n-1}}

.

Note, that the mean width can be defined for any body (that is compact), but it is most

useful for convex bodies (that is bodies, whose corresponding set is a convex set).