Esssentials of Applied Data Analysis
IPSA-USP Summer School 2018

Basic Mathematics Review

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Basic Mathematics

Basic notions of algebra, notation and functions.

Basic Operations

Notation	Natural numbers	Examples
$+$	Addition	$40 + 2 = 42$
$-$	Subtraction	$44 - 2 = 42$
$* or \times$	Multiplication	$6 * 7 = 42$
$\div$	Division	$42 \div 7 = 6$
x^a	x to the power of a	$5^2 = 25$; $10^4 = 10.000$
$\sqrt[n]{x}$	nth of x	$\sqrt[2]{25} = 5$; $\sqrt[4]{10.000} = 10$

Summation and Product

Summation: $\sum_{i=1}^{n} x_i = x_1 + x_2 + ... + x_n$

Example:

i	x_i
1	10
2	15
3	9
4	2
5	6

$\sum_{i=1}^{5} x_i = x_1 + x_2 + x_3 + x_4 + x_5 = 10 + 15 + 9 + 2 + 6 = 42$

Product: $\sum_{i=1}^{n} x_i = x_1 \times x_2 \times ... \times x_n$

Example:

i	x_i
1	10
2	15
3	9
4	2
5	6

$\sum_{i=1}^{5} x_i = x_1 \times x_2 \times x_3 \times x_4 \times x_5 = 10 \times 15 \times 9 \times 2 \times 6 = 16200$

Arithmetic Properties

Associative:
$$(a + b) + c = a + (b + c)$$

Commutative:
$$a + b = b + a$$

Distributive:
$$a(b + c) = ab + ac$$

Identities:
$$x + 0 = x$$
$$x \times 1 = x$$

Inverse:
$$(-x) + x = 0$$
$$x^{-1} \times x = \left(\frac{1}{x}\right) \times x = 1$$