

Essentials 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

Symbol	Operation	Examples
+	Addition	$40 + 2 = 42$
−	Subtraction	$44 - 2 = 42$
<i>*or</i> ×	Multiplication	$6 * 7 = 42$
÷	Division	$42 \div 7 = 6$
x^a	x to the power of a	$5^2 = 25$; $10^4 = 10.000$
$\sqrt[n]{x}$	n th of x	$\sqrt[2]{25} = 5$; $\sqrt[4]{10.000} = 10$

Summation and Product

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

	$\begin{array}{c c} i & x_i \\ \hline 1 & 10 \\ 2 & 15 \\ 3 & 9 \\ 4 & 2 \\ 5 & 6 \end{array}$	
Example:		$\sum_{i=1}^5 x_i = x_1 + x_2 + x_3 + x_4 + x_5 = 10 + 15 + 9 + 2 + 6 = 42$

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

	$\begin{array}{c c} i & x_i \\ \hline 1 & 10 \\ 2 & 15 \\ 3 & 9 \\ 4 & 2 \\ 5 & 6 \end{array}$	
Example:		$\sum_{i=1}^5 x_i = x_1 \times x_2 \times x_3 \times x_4 \times x_5 = 10 \times 15 \times 9 \times 2 \times 6 = 16200$

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:

$$(-x) + x = 0$$

$$x^{-1} \times x = \left(\frac{1}{x}\right) \times x = 1$$