# *SUBJECT    MATTER*

*The chapter 5 "Limits and continuity" consists of  four sections.*

In the first section, we define and study the limits of real functions of one real variable, i.e. of functions defined in a subset of $\mathbb{R}$ , whose values belong to $\mathbb{R}$ . In particular:

o  the upper bound and the lower bound
o  the maximum and the minimum
o  the supremum (or least upper bound) and the infimum (or greatest lower bound)
o  the symbols infinity and minus infinity
o  the point of accumulation
o  the limit of a function in a point (at finite or at infinity)
o  function that converges in a point, function that positively diverges in a point, function that negatively diverges in a point, function regular in a point
o  equivalent formulations of definition of limit
o  uniqueness of the limit
o  the sign permanence
o  left-hand and right-hand limit
o  function monotonically decreasing, function monotonically increasing
o  limit of a function monotonically decreasing, limit of a function monotonically increasing
o  limit of the inverse function
o  limit of the composite function
o  operations on limits
o  indeterminate forms
o  upper and lower limits
o  criterion of Cauchy for convergence
o  theorems of comparison on limits
o  infinitesimal (or infinitely small function), infinity (or infinitely large

# *SUBJECT    MATTER*

function)
- order of an infinitesimal, order of an infinity.

In the second section, we define and study the limits of real functions of several real variables, i.e. of functions defined in a subset of $\mathbb{R}^n$ , whose values belong to $\mathbb{R}$ . In particular:

- the function absolute value
- the open ball of $\mathbb{R}^n$,
- the interior point
- the open set
- the limit of a real function of several real variables
- equivalent formulations of definition of limit
- the limit of the absolute value function.

In the third section, we define and study the continuity of real functions of one real variable. In particular:

- the continuous function in a point
- the function continuous on its domain
- functions continuous on a bounded closed interval
- the continuity of the composite function
- discontinuities
- theorem of Weierstrass for functions continuous on compacts of $\mathbb{R}$
- uniform continuity
- theorem of Cantor for uniform continuity.

In the four section, we define and study the continuity of real functions of several real variables. In particular:

- the continuous function in a point
- the function continuous on its domain
- the continuity of the composite function

# *SUBJECT    MATTER*

o   theorem of Weierstrass for functions continuous on compacts of $\mathbb{R}^n$
o   uniform continuity.